

# The Redevelopment of The River Club

Transport Impact Assessment

Reference: 112405/01

Revision: 1

20 October 2017

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# Document control record

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<b>Report title</b>		The Redevelopment of the River Club – Transport Impact Assessment				
<b>Document ID</b>		<b>Project number</b>		112405		
<b>File path</b>						
<b>Client</b>		Indigo Properties & Zenprop				
<b>Client contact</b>		<b>Client reference</b>				
<b>Rev</b>	<b>Date</b>	<b>Revision details/status</b>	<b>Author</b>	<b>Reviewer</b>	<b>Verifier (if required)</b>	<b>Approver</b>
0	20 October 2017	Draft Report	T Joubert	HJ Taljaard	JHB Conradie	JHB Conradie
1	16 February 2018	Final Report	T Joubert	HJ Taljaard	JHB Conradie	JHB Conradie
<b>Current revision</b>		1				

Approval			
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## **Appendix A**

Modelling Study Report

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Other Reference Reports

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Traffic Data

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Existing Intersection Layouts

## **Appendix E**

Sidra Output Results

# 1 Introduction

## 1.1 Brief

Aurecon South Africa (Pty) Ltd was appointed by Indigo Properties & Zenprop to prepare a Transport Impact Assessment Report (TIA) for the proposed Redevelopment of the River Club in support of the approval of the Redevelopment.

## 1.2 Locality

The proposed development is located on Erf 15832 between Liesbeek Parkway and the M5 at the juncture of the Black River to the east and the Liesbeek River on the west, south of the Salt River railway depot. As indicated in Figure 1.



Figure 1: Location of the Site

## 1.3 Proposed Development

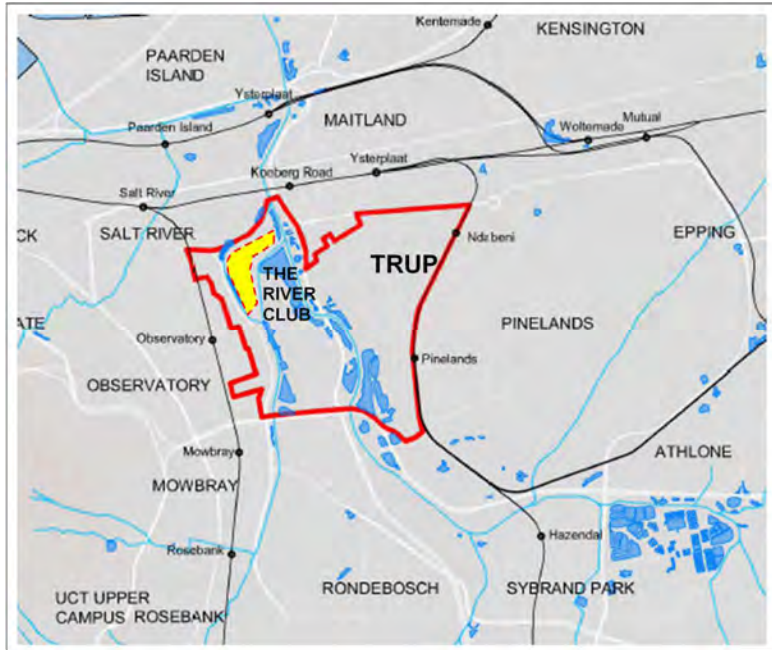
The proposed redevelopment of the River Club comprises of two Precincts as follows:

**Precinct 1:** Mixed Use development including land use such as Conference, Hotel, Retail, Restaurant, Office, Gym and Residential.

**Precinct 2:** Predominantly Offices.

The River Club development falls within the Two Rivers Urban Park (TRUP) which is a wider area redevelopment initiative lead by the Western Cape Provincial Government as indicated in Figure 2 below:





**Figure 2: The River Club in Context of the TRUP Initiative**

The River Club redevelopment will form an integral part of the TRUP initiative and will have to be aligned with the TRUP objectives with respect to transport requirements.

The required external and internal road upgrades with appropriate access to the existing road network will be part of the redevelopment.

## 1.4 Objectives of this study

The objectives of this assessment are:

- To describe the proposed development scope;
- To assess the access arrangements;
- To assess the existing traffic conditions on the road network in the vicinity of the site;
- To quantify potential peak hour trip generation by the proposed development and to propose a distribution on the road network;
- To assess the traffic impact of the development traffic on the road network;
- To evaluate the impact of proposed future network improvements on the traffic conditions;
- To determine any potential road improvements required to mitigate the impacts as a result of the development traffic;
- To quantify parking requirements with respect to the TRUP initiative; and
- To propose public transport requirements and NMT needs.

To achieve these objectives, the following is required:

- Traffic counts at the identified intersections during the AM and PM peak periods;
- Transport modelling on the surrounding road network to confirm potential changes in traffic behaviour after implementation of network changes (refer to Appendix A and Chapter 4);
- Determination of the status quo of intersection performance;
- Determination of the base year traffic plus development traffic for various development phases;



- Determination of the anticipated traffic impacts on the existing road network and intersections for the base year and after 5-years with an appropriate growth factor; and
- Recommendation for mitigation of traffic impacts where required.

## 1.5 Extent of Study Area

The guideline document TMH 16, Volume 1, 2012. "South African Traffic Impact and Site Traffic Assessment Manual", has been used to determine the extent of the traffic study. As a result of the scope of the proposed development, a full detailed macro TIA is required.

The anticipated traffic impact on the surrounding road network, includes the following intersections in the table below (as confirmed by the City of Cape Town's Transport and Urban Development Authority (TDA) Development Control) and as illustrated in Figure 3:

**Table 1: Intersections Included in Study**

No	Description	Remark
1	Liesbeek Parkway / Settlers Way on-and-off ramps	Signalised
2	Liesbeek Parkway / Observatory Road / Station Road	Signalised
3	Observatory / Existing access to the River Club	
4	Liesbeek Parkway / Link Road / New access	Signalised – New Access
5	Liesbeek / Malta / Berkley	Future Signalised Intersection
6	Berkley / Potential New Development access	New Signalised Access
7	M5 North / Berkley Road Ramp Terminal	Un-signalised but future signalised
8	M5 South / Berkley Road Ramp Terminal	Un-signalised but future signalised
9	Internal Intersection Precinct 1	New Intersection on Internal Road

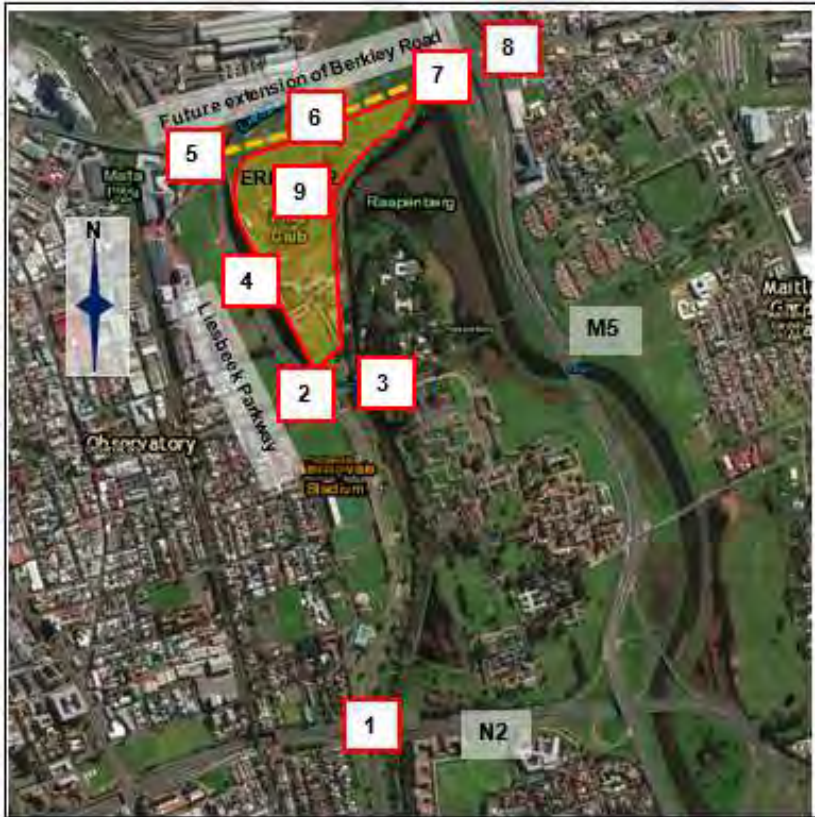


Figure 3: The Intersections included in evaluation

## 1.6 Reference Material Included

Various reports compiled by others and listed in Table 2, were taken into account in the compilation of this report. Relevant extracts from these reports is available on request and available as separate documents.

Table 2: Other Reports referenced

Report Title	Date of Report	Firm / Author
TRUP Final Engineering Services Model Report-April 2017	April 2017	Royal HaskoningDHV and NM & Associates Planners and Designers
River Club TIA Report - August 2015 Rev0	August 2015	Kantey & Templer
Traffic Model Analysis Report	October 2017	W Crous

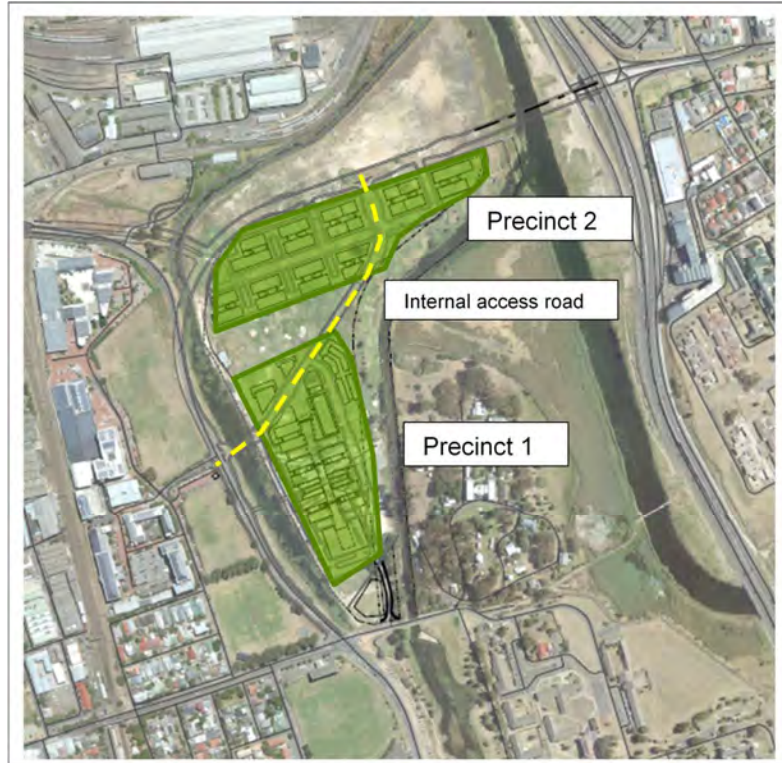
## 2 Proposed Land use

### 2.1 Detail of development

The proposed development comprise of two precincts as follows:

- Precinct 1 consists of mixed-use land uses such as a hotel, retail, offices, residential components, restaurants, conferencing, a gym and a stand-alone pavilion with a total bulk of 65 000 m<sup>2</sup>.
- Precinct 2 also consists of mixed-use land uses such as offices, retail, residential and a private school with a total bulk of 85 000 m<sup>2</sup>.

The combined bulk of Precinct 1 and 2 is 150 000m<sup>2</sup>.



**Figure 4: The Proposed Precincts of the Development**

An internal road links the two Precincts to the road network.

The land use for the respective precincts are presented in Table 3 below:

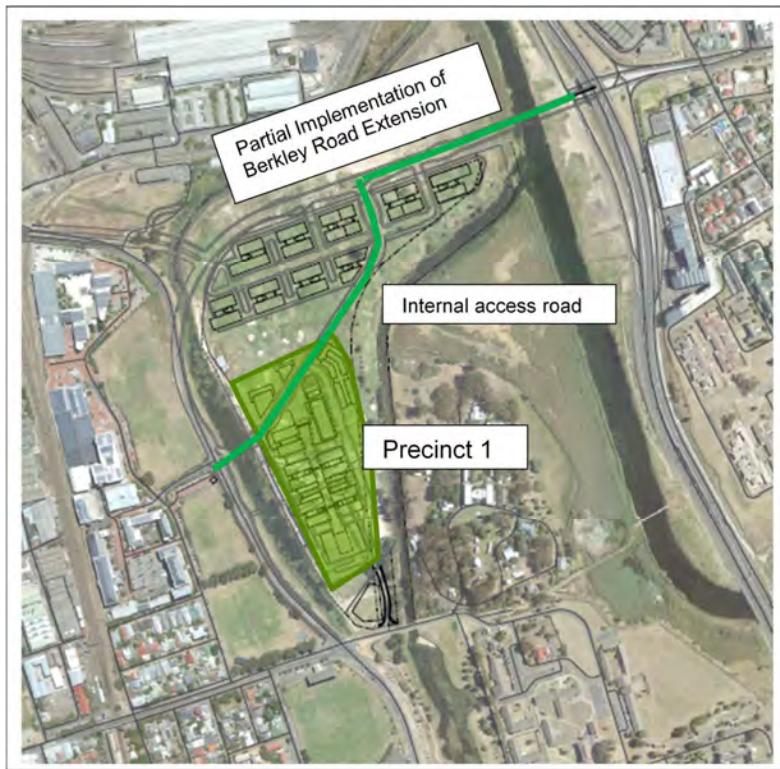
**Table 3: Land use per Precinct**

Precinct	Description	Size (m <sup>2</sup> )	GLA (m <sup>2</sup> )
<b>1</b>	Conferencing	1200	1020
	Hotel	8200	6970
	Retail	15700	13345
	Restaurant	9200	7820
	Office	15100	12835
	Gym	4100	3485
	Escapes and deliveries	2100	1785
	Pavilion	1000	850
	Residential	8400	7140
<b>Precinct 1 Total</b>		<b>65 000</b>	<b>55 250</b>
<b>2</b>	Office	44500	37825
	Residential	23500	19975
	Private School	10000	8500
	Retail	5000	4250
	Ancillary	2000	1700
<b>Precinct 2 Total</b>		<b>85 000</b>	<b>72 250</b>
Total Bulk		<b>150 000</b>	
Total GLA			<b>127 500</b>

## 2.2 Phasing of the development

The phasing of implementation is proposed in two Phases as follows:

### 2.2.1 Phase 1 (Precinct 1)

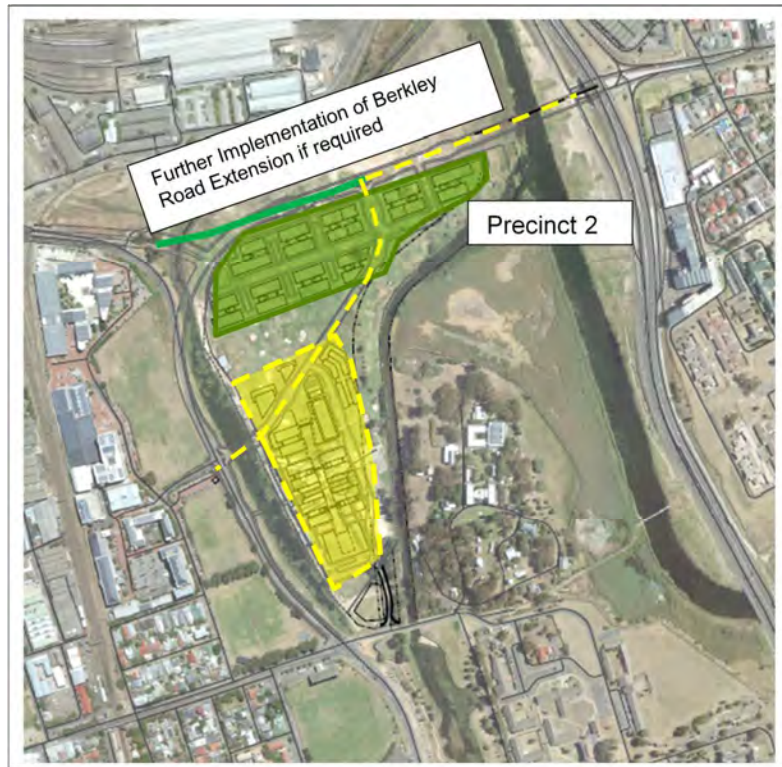


**Figure 5: Phase 1 of the Development (Precinct 1)**

Phase 1 would most probably be implemented within the next 3 - 5 years on approval of the project.



## 2.2.2 Phase 2 (Precinct 2)



**Figure 6: Phase 2 of the Development (Precinct 2)**

Phase 2 would most probably be partially implemented between 3 – 5 years after approval but will most probably be driven by market forces. It is expected that this phase will be implemented in the medium term - most probably 5 – 10 years after approval.

## 3 Access arrangements

### 3.1 Road hierarchy

The road hierarchy in the vicinity of the site is indicated in Figure 7:

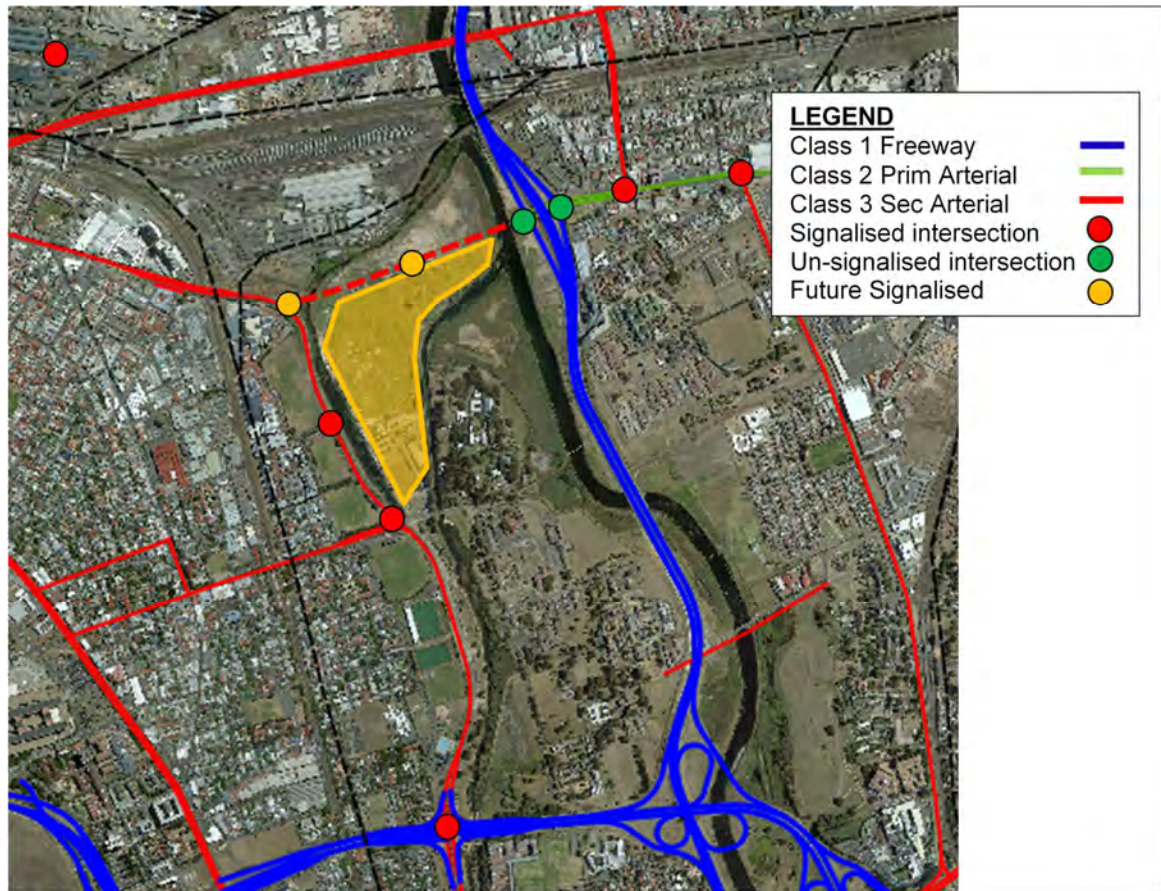


Figure 7: Road Hierarchy in the Vicinity of the Development

From this it can be concluded that the Site is well supported by the Road Network. The future extension of Berkley Road is indicated as a Class 3 road as confirmed by the TDA.

### 3.2 Access guidelines

Access guidelines currently in use are:

- The Road Access Guidelines (RAG) 2001
- The Draft Access Management Guidelines (AMG) 2016

Both these guidelines are issued by the Provincial Road Network Infrastructure Branch. The TDA currently still uses the RAG but requires that reference is made to the AMG for comparison.



Table 4 summarises the access spacing for various development environments on a Class 3 road since access to the development will have to be obtained from a Class 3 road.

Table 4: Access Spacing on Class 3 Road

Development Environment	Road Access Guidelines (2001)			Access Management Guidelines (2016)		
	Signalised	Un-signalised	Left-in	Signalised	Un-signalised	Left-in
Intermediate	375m	120m	90m	370m	225m	80m – Note 1 225m – Note 2
Suburban	540m	180m	120m	540m	260m	105m – Note 1 260m – Note 2

**Note:**

- 1 Downstream from a full signalised intersection
- 2 Upstream from a full signalised intersection

The only significant difference is the spacing for an upstream Left-in access and a signalised intersection which is 90m in the case of the RAG but 225m in the case of the AMG for an intermediate environment.

### 3.3 Development Environment

The development environment on Berkley Road and Liesbeek Parkway after the redevelopment of the River Club could be considered as **Intermediate**. This was also confirmed as acceptable by the TDA.

### 3.4 Access positions

The current spacing between proposed intersections is illustrated in Figure 8:

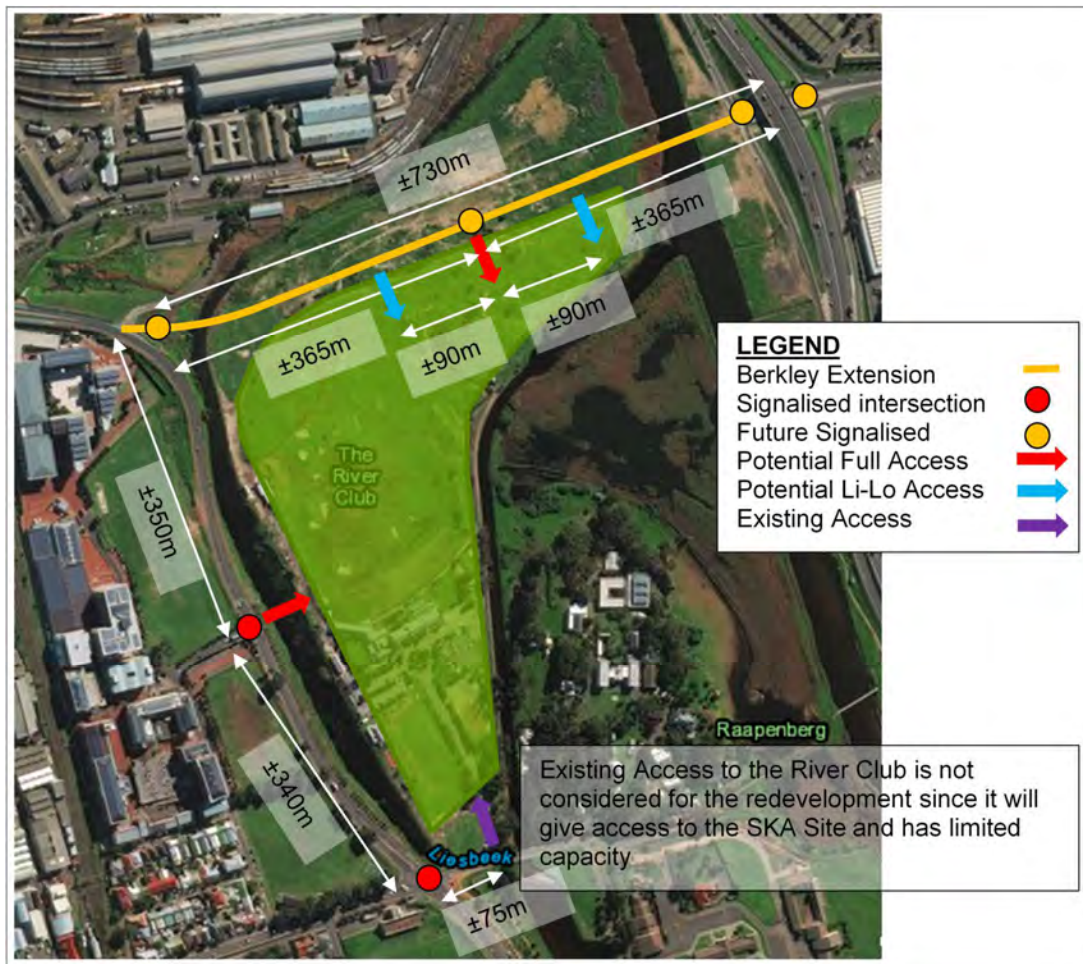


Figure 8: Access Spacing

Based on the above, the potential access positions are described as follow in Table 5:

**Table 5: Access Spacing on Class 3 Road in an Intermediate Environment**

Road	Description	Remark
Observatory Road	Access at the existing Access position of River Club	The access spacing is only 75m and the access will ultimately only have moderate driveway capacity with a Left-in Left-out access arrangement and is not considered as a significant access opportunity. This access is therefore not considered as a useable access.
Liesbeek Parkway	Access to Development opposite Link Road	<ul style="list-style-type: none"> <li>Liesbeek Parkway is a Class 3 Road</li> <li>the intersection is already signalised</li> <li>Spacing slightly short of the preferred spacing of 375m</li> </ul> <p>The intersection offers an ideal access opportunity</p>
Berkley Road Extension	Main Access to Development halfway between the M5 and intersection with Malta Rd & Liesbeek Parkway	The spacing between the M5 and future Malta /Liesbeek/ Berkley intersection of 365m is very close to the preferred spacing of 375m for a Class 3 road. It is deemed acceptable.
	Secondary access to Development	<p>Secondary left-in left-out access can be obtained at two positions 90m from the main access. These accesses will</p> <ul style="list-style-type: none"> <li>give direct access to Precinct 2 and</li> <li>alleviate congestion at the main intersection</li> </ul>

## 4 Transport Modelling

### 4.1 Scope of Modelling

This traffic model study involved an EMME/4 transport modelling analysis of the road system in the area of the River Club development to:

- predict background traffic behaviour with changes to the road network; and
- to predict traffic conditions with other proposed developments such as the TRUP initiative and the City's future 2032 Pragmatic Densification land use scenario.

The following was included as part of this study:

- Calibrated transport model estimates for the 2017 base year;
- Public and private transport estimates for a future 2032 land use scenario which includes trips generated across the metropolitan area.
- The analysis of alternative network scenarios with, and without, other road improvements in the vicinity of the proposed project;
- The incorporation and assessment of future public transport proposals for the area; and
- Graphic outputs of modelling results, including peak hour traffic, peak period traffic and volume/capacity ratios and public transport passenger estimates.

### 4.2 Land Use Scenarios modelled

The following 4 land use scenarios were considered:

- 2017 Base Year (without the proposed development). This has mainly been used to calibrate and validate the model outputs in terms of present traffic and passenger counts, and to provide a general assessment of the network performance. This scenario was also used to test the impact of completing the Berkley Road connection with present traffic demand.
- 2017 Base Year with Precinct 1 of the proposed development. This was to establish a minimum level of infrastructure requirement and to assess if incremental infrastructure development is feasible.
- 2017 Base Year with both phases of the proposed development. Other future long-term developments were excluded in order to determine the total infrastructure needs of Precincts 1 & 2 combined.
- 2032 Future Pragmatic Densification Land Use Scenario with the proposed development. This scenario allows for a comprehensive assessment of the River Club development in conjunction with other land use developments in the sub-region.

## 4.3 Traffic Scenarios

The following traffic scenario runs were made:

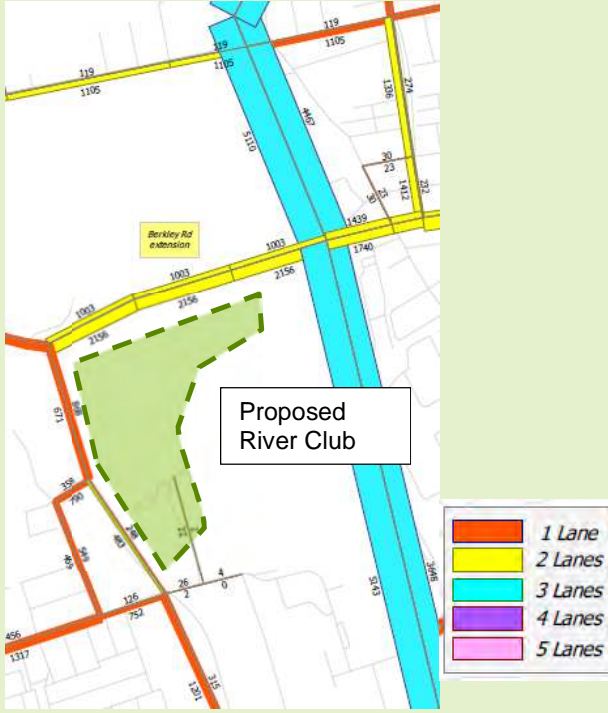
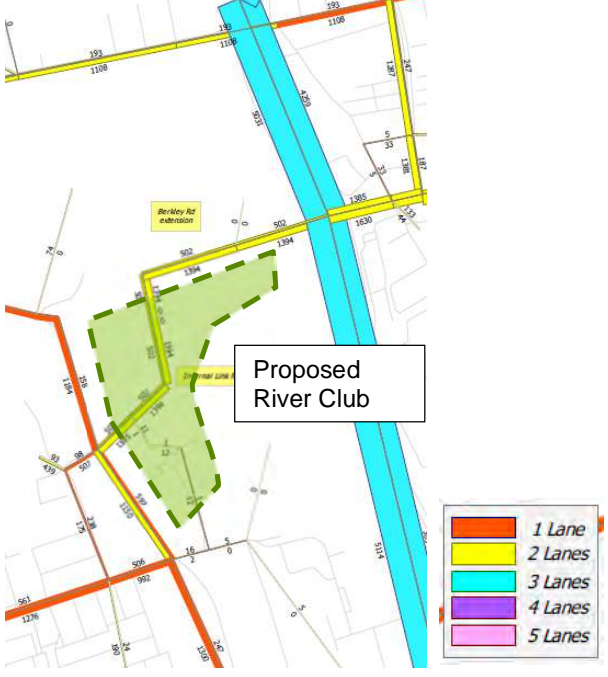
- Base Year (2017) land use development with present transport network;
- Base Year (2017) land use development with the completion of Berkley Road;
- Base Year (2017) land use with Precinct 1 River Club Development;
- Base Year (2017) land use with full River Club Development; and
- Future 2032 modified PD land use scenario with full River Club Development.

## 4.4 Results of Modelling

A few significant results of the modelling are given in Table 6:

Table 6: 2017 Model Traffic results

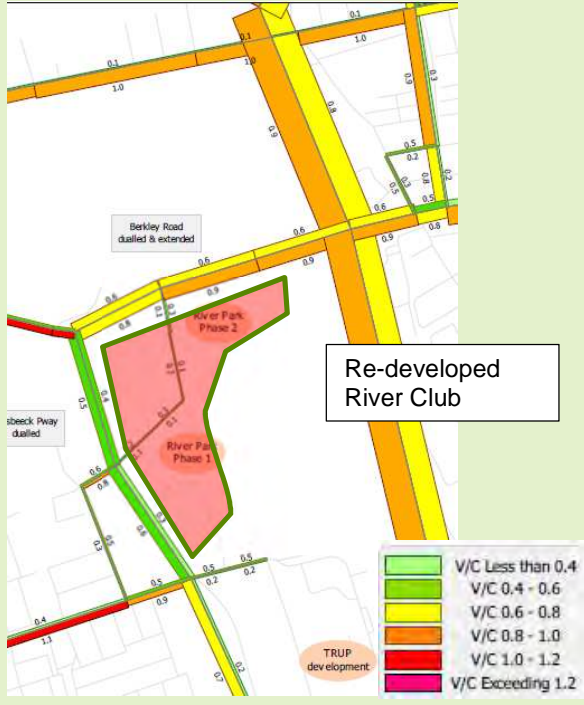
Description	Traffic	Finding
Existing Network with 2017 traffic	Volume/Capacity indicated 	Certain network elements such as Liesbeek Parkway between the N2 and Station Road are functioning at capacity during the AM Peak period

Description	Traffic	Finding
<p>Future Network with 2017 traffic</p>	<p>Peak Hour Volumes Indicated</p>  <p>The map shows the Proposed River Club (green dashed outline) and the Berkley Rd extension (yellow line). Traffic volumes are indicated by numbers on the roads. A legend indicates lane configurations: 1 Lane (orange), 2 Lanes (yellow), 3 Lanes (cyan), 4 Lanes (purple), and 5 Lanes (pink).</p>	<p>If the planned Berkley extension to Malta Road is implemented a significant volume of traffic will be attracted to this link. This implies that there is already a great demand for this extension. Furthermore the attraction is such that the road should be a 4-lane road when opened to traffic.</p>
<p>Internal Link Road between M5 and Liesbeek Parkway constructed with 2017 traffic</p>	<p>Peak Hour Volumes Indicated</p>  <p>The map shows the Proposed River Club (green dashed outline) and the Internal Link Road (yellow line). Traffic volumes are indicated by numbers on the roads. A legend indicates lane configurations: 1 Lane (orange), 2 Lanes (yellow), 3 Lanes (cyan), 4 Lanes (purple), and 5 Lanes (pink).</p>	<p>If Berkley Road is extended partially as a single carriageway road and linked through the development to Liesbeek Parkway, it will immediately attract capacity background traffic volume through the development if no restrictive measures such as access control or speed restrictions are implemented.</p>



Description	Traffic	Finding
<p>Future network with Full proposed development including the link road through the development.</p>	<p>Peak Hour Volumes Indicated</p>	<p>If Berkley Road is extended through to Malta Road, the development will attract predominantly development traffic and passer by traffic will rather use the Berkley Road extension</p>
<p>Future network with Full proposed development including the link road through the development</p>	<p>Volume/Capacity indicated</p>	<p>The Vehicle / Capacity ratios shows that the future network can accommodate the development</p>



Description	Traffic	Finding
2032 model traffic with the Pragmatic Densification (Such as TRUP)	<p>Volume/Capacity indicated</p> 	<p>The Model reflects similar conditions as for 2017 traffic with the River Club full development. This is mainly due to the expected increase in Public Transport usage. Ultimately the road network in the vicinity of the River Club will have to be upgraded to 4 lane roads to accommodate the traffic demand at acceptable Level of Service / Capacity ratio. The exception is Malta Road which remains at capacity and which cannot be upgraded to a 4 lane road without major implications due to the narrow road reserve and the heritage structures along the road.</p>

From this it is derived that:

- Various network elements are at capacity without the development and should be considered as backlog infrastructure which will have to be provided within the next few years. Failing to do so will lead to increased peak periods.
- The extension of Berkley Road from the M5 to Liesbeek Parkway/Malta Road draws a significant volume of traffic and is therefore a desired network link. This road will have to be a 4-lane road if constructed because of the traffic demand.
- If the development Link Road with partial extension of Berkley Road is constructed without any form of access control or speed reduction measures, then the background traffic will use the link as a through road and leave no capacity for the development.
- If Berkley Road is fully extended, then it appears that the background traffic will rather use the Berkley extension and the link road through the development will draw predominantly development traffic.
- Some form of control must be exercised through the development to prevent background traffic using the internal link road as a through road until Berkley Road is extended through to Liesbeek Parkway / Malta Road.
- The Road Network will be able to carry the traffic demand assuming that:
  - Certain upgrades are implemented (Dualling of Liesbeek and full extension of Berkley Road)
  - There is an increase in Public Transport use as the model is based on long term changes in expected income levels with associated changes in travelling mode preferences (the

expectancy is that vehicles will reduce and that more people will use public transport as preferred mode based on trends elsewhere in the world).

- Malta road remains on capacity but has limited upgrade potential due to road reserve limitations.

Relevant detail results are provided under the traffic conditions for the various network stages. It should be noted that the modelling provided link volumes on the network with no turning movements indicated, thus a weighted average approach was followed to determine the likely traffic movement volumes at intersections.

The detailed results and specialist report of the model study are given in **Appendix A**.

## 5 Existing Traffic Conditions

### 5.1 Road Network

There are two network layouts in the vicinity of the development that needs to be considered:

- Existing Network
- Future Network with Berkley Road extended from the M5 to the Malta Road / Liesbeek parkway intersection

The road network in the vicinity of the site is indicated in Figure 9 and listed below:

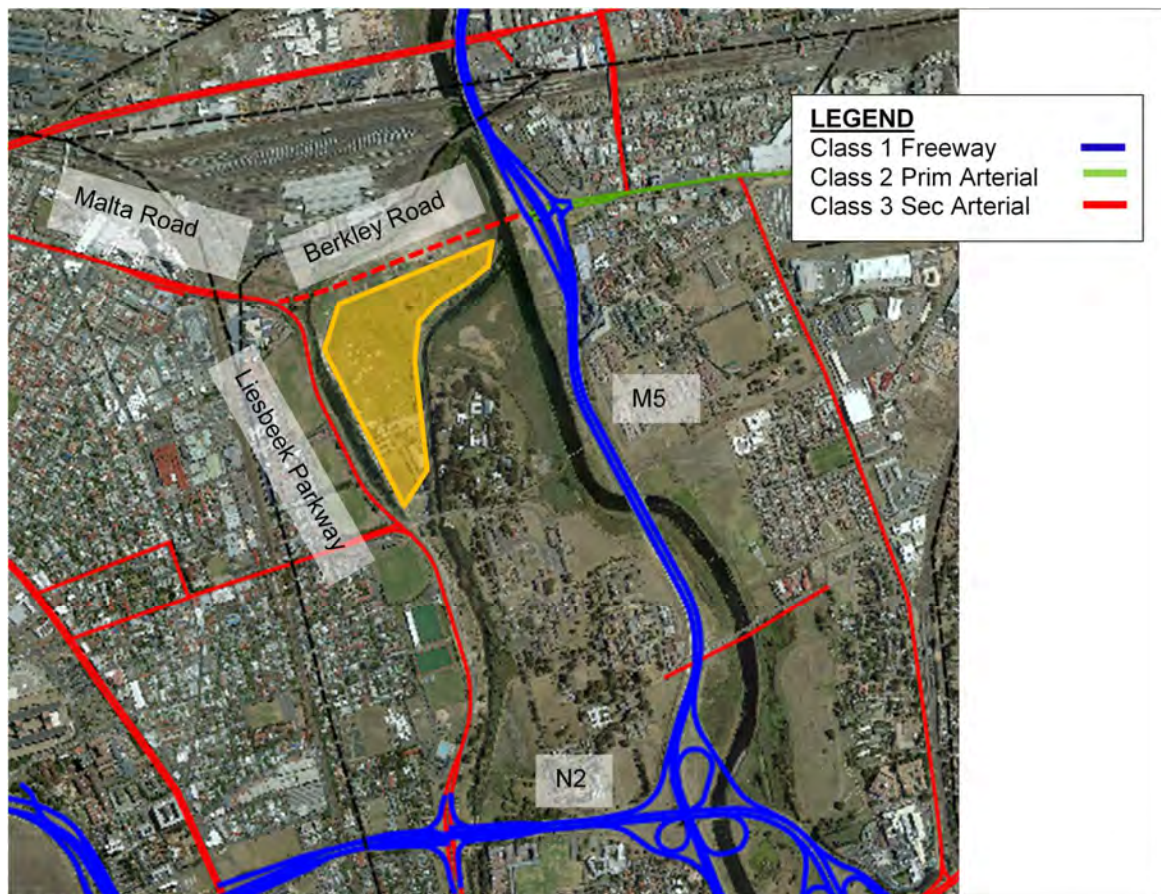


Figure 9: Road Network in the Vicinity of the Development

#### 5.1.1 Existing Network

- National Road 2: 6 lane Freeway to the south
- M5: 4-lane freeway to the east
- Liesbeek Parkway to the west partially dual carriageway and single carriageway
- Berkley Road: Class 2 arterial presently a single carriageway to the east of the M5
- Malta Road: Class 3 road with limited upgrade potential due to road reserve limitations

### 5.1.2 Future Network

The following network changes are planned:

- Berkley upgraded to divided 4-lane road to the east of the M5; and
- Berkley Road extended to Malta Road as a 2-lane or 4-lane road as required.

## 5.2 Proposed developments

The following proposed developments will impact on the longer-term traffic:



- The re-development of the River Club;
- The TRUP initiative in the long term; and
- The upgrading of the Passenger Rail Association of South Africa (PRASA) Site to the north of Berkley/Malta road.

PRASA prepared a new structure plan for the Site to the north of Berkley Road extension. The TDA addressed a request to PRASA to provide details of the structure plan but it was not available at the time of completing this study. Nevertheless, Aurecon approached former employees closely involved with the master plan to advice on the access arrangement proposed. It appeared that the intension by PRASA was to access the network at or close to the future Malta / Liesbeek / Berkley intersection and this should be taken into account with future designs and alignments of the future intersection.



Two alternative locations of the Malta / Berkley / Liesbeek intersection are possible:

**Table 7: Alternative positions for Malta / Liesbeek / Berkley Intersection**

Option	layout	Remark
1		<ul style="list-style-type: none"> <li>• Preferred from a traffic flow perspective due to the fact that Malta Road has limited capacity improvement possibilities.</li> <li>• Crosses the Old Liesbeek River twice</li> <li>• Limited access to the PRASA Site due to the close proximity of a major intersection</li> </ul>
2		<ul style="list-style-type: none"> <li>• Crosses the Old Liesbeek River once</li> <li>• Ideal access to the PRASA Site incorporated in intersection</li> </ul>

Option 2 should be implemented as the more appropriate layout in the long term.

## 5.3 Traffic Counts

To determine the existing traffic scenario, classified traffic counts were undertaken at the intersections listed in Table 8 below.

Table 8: Traffic Count Data

Intersection	Short Description	Date	Time(s)	remark
1	Liesbeek / N2	17 August 2017	06:00 – 10:00 15:00 – 19:00	
2	Liesbeek/Station			
3	Observatory/access			Not taken
4	Liesbeek/Link	17 August 2017	06:00 – 10:00 15:00 – 19:00	
5	Liesbeek/Malta	17 August 2017	06:00 – 10:00 15:00 – 19:00	
6	Berkley/Access			N/a
7	M5 North/Berkley	23 March 2017	06:00 – 10:00	Recent counts by others
8	M5 South/Berkley	23 March 2017	06:00 – 10:00	Recent counts by others
9				N/a

The following peak periods were established:

- Weekday AM peak hour - 07:45 to 08:45
- Weekday PM peak hour - 16:15 to 17:15

The traffic data can be found in **Appendix C**.

## 5.4 Traffic Modelling for Existing Traffic

The traffic counts were used to ensure the model results reflect the actual traffic on the existing road network. The model correlated well with the actual counts when link volumes are compared and can therefore be considered reliable for the study.

The link volumes of the model versus counts is shown in Table 9:

Table 9: Comparison of AM Link Volumes between Model and Counts

Road	Link	Counts		Model	
		Northbound	Southbound	Northbound	Southbound
Liesbeek Parkway	N2 - Station Road	1538	608	1654	267
	Station - Link Road	819	267	1012	114
	Link - Malta Road	457	354	947	89

Overall the volumes compare reasonable.

The summarised results of the surrounding roads are shown in Table 10 below:

Table 10: Modelling Results for 2017 Traffic on Network



It can be concluded that for:

### 5.4.1 Existing Network

- Liesbeek Parkway south of Station Road (1 lane per direction) functions at capacity during peak hours
- The peak period is currently estimated between 1 and 2 hours along the proposed development and between 2 and 3 hours on Liesbeek Parkway south of the development



## 5.4.2 Future Network

- A significant volume of traffic will use the extended Berkley Road which reduces demand on Liesbeek South of Station Road;
- The extension of Berkley Road will have to be a 4-lane road (2-lanes per direction);
- The peak period will be in excess of 2 hours;
- Malta road experiences capacity conditions from the Liesbeek / Berkley / Malta intersection; and
- Station Road also experiences capacity conditions.

## 5.5 Traffic Growth

The historic traffic growth for this area indicates a relatively low growth rate due to the existing congestion levels during peak periods.

For purposes of this TIA a growth rate of 3% was assumed to consider impact of short term local growth.

## 5.6 Analyses Criteria

The impact on capacity and operation was analysed per turning movement at the critical intersections using SIDRA software during AM and PM Peak periods. The analysis considered the following aspects:

- Level of Service (LOS with A being the best and F being the worst - see Table 11 for LOS definitions);
- Average Delay per Vehicle (Seconds); and
- Degree of Saturation (v/c ratio).

Table 11: Level of Service (LOS) Definition

LEVEL OF SERVICE (LOS)	INTERSECTION TYPE	
	SIGNALS & TRAFFIC CIRCLES (Delay in Seconds)	STOP & YIELD CONTROLLED (Delay in Seconds)
A	$d < 10$	$d < 10$
B	$10 < d < 20$	$10 < d < 15$
C	$20 < d < 35$	$15 < d < 25$
D	$35 < d < 55$	$25 < d < 35$
E	$55 < d < 80$	$35 < d < 50$
F	$80 < d$	$50 < d$

## 5.7 Intersection Analysis

The intersections listed in Table 1 were analysed with SIDRA Intersection software on the existing geometric layouts and the level of service (LOS) determined for each intersection.

### 5.7.1 Geometric Layouts

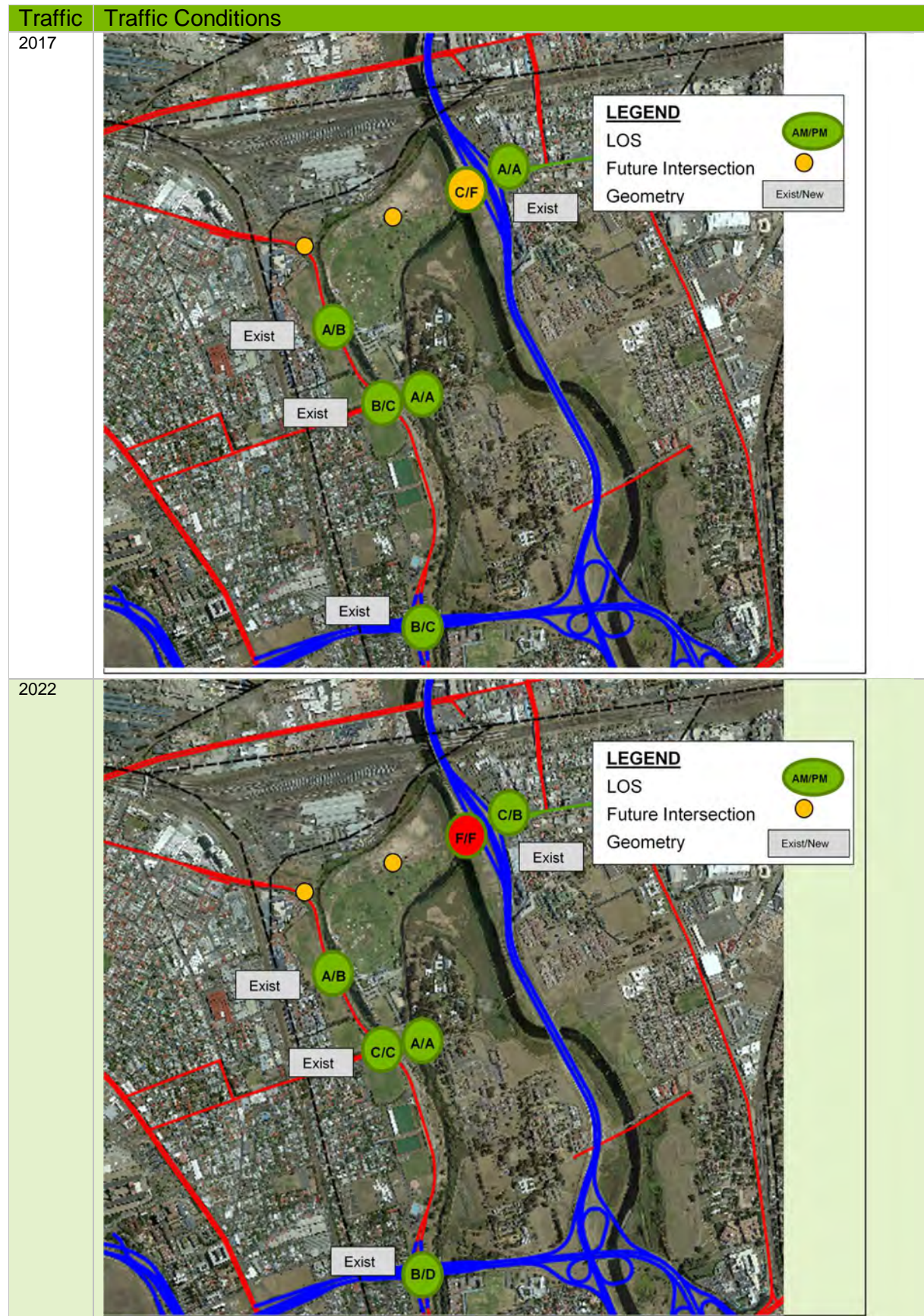
Figures of the existing geometric layouts for the intersections under consideration are given in **Appendix D**.

### 5.7.2 Existing Traffic Conditions

#### Existing Network

Table 12 indicates the 2017 and 2022 AM and PM Peak traffic conditions and LOS of each intersection, based on the existing road geometries, traffic counts and current phasing times. All supporting SIDRA outputs are given in **Appendix E**.

Table 12: Existing network Intersection Analysis Summary





## Future Network

Table 13 indicates the 2022 AM and PM Peak traffic conditions and LOS of each intersection, for the future road network using traffic modelling results. New intersections are considered with the proposed future geometry. All supporting SIDRA outputs are given in **Appendix E**.

Table 13: Future network Intersection Analysis Summary



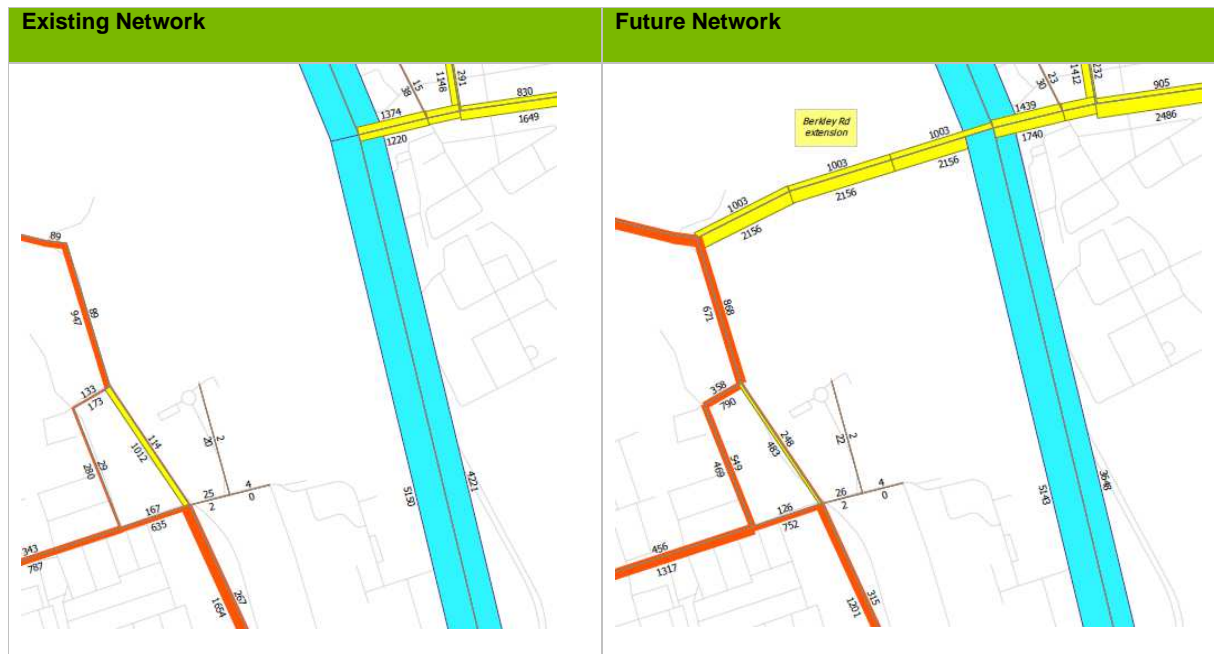
**Note:** Because it is expected that the Future network will not be implemented within 5 years only the 2022 conditions are considered using the 2017 model background traffic escalated to 2022. New intersections are however provided to suit for the ultimate conditions.

## 5.8 Link Volumes

The total two-way capacity of a two-lane road is approximately 1800 vehicles per hour. The traffic modelling analysis indicated the link volumes on the roads in the vicinity. The number of lanes were increased in the model on the future network as required to reduce the peak periods of links at capacity.

The Peak Hour traffic flow obtained from the EMME model for 2017 traffic on the existing and future road network is shown in Table 14 below:

**Table 14: Peak Hour Traffic on links**



It is clear that the extension of Berkley Road attracts a significant volume of traffic to such an extent that a 4-lane facility (2-lanes per direction) will be required. Other roads experience similar conditions in the future except Station Road, Northern portions of Liesbeek Parkway and Malta Road which will have increased traffic.

If these sections are not upgraded, then the peak periods will extend to more than 2 hours.

## 6 Development Traffic

### 6.1 Trip Generation

Trip generation rates were obtained from the South African Committee of Transport Officials (COTO) Trip Data Manual, TMH 17, Volume 1 (2013).

A breakdown of the proposed land uses per phase is indicated below in Table 15 and Table 16. These land use areas have been used to calculate the trip generation for each specific land use for the AM and PM peak hours as shown in the tables. Trip reduction rates were applied for “mixed-use” development, as allowed for and described in the TMH 17.

The development is planned in two phases and the implementation of these are expected to occur within the next 5-10 years. It is estimated that the development could generate the following approximate peak hour trips.

**Table 15: Land use trip rates and distribution**

Precinct	Land Use	Code	Bulk [m <sup>2</sup> ]	Size (GLA) [m <sup>2</sup> ]	Size for Trips	Unit for Trips	Trip Rate		Reduction Mixed Use	AM Distribution		PM Distribution	
							AM	PM		IN %	OUT %	IN %	OUT %
1	Conferencing	780	1200	1020	1020	seats	0.5	0	10%	90%	10%	0%	0%
	Hotel	310	8200	6970	160	rooms	0.5	0.5	20%	60%	40%	55%	45%
	Retail	820	15700	13345	13345	/100m <sup>2</sup>	0.6	3.4	10%	65%	35%	50%	50%
	Restaurant	932	9200	7820	7820	/100m <sup>2</sup>	0	8.0	10%	0%	0%	65%	35%
	Offices	710	15100	12835	12835	/100m <sup>2</sup>	2.1	2.1	20%	85%	15%	20%	80%
	Gym	492	4100	3485	3485	/100m <sup>2</sup>	5.0	9.5	15%	50%	50%	60%	40%
	Escapes and deliveries		2100	1785	0	n/a	0	0	0	0	0	0	0
	Pavilion		1000	850	0	n/a	0	0	0	0	0	0	0
	Residential	220	8400	7140	255	units	0.65	0.65	15%	25%	75%	70%	30%
2	Office	710	44500	37825	37825	/100m <sup>2</sup>	2.1	2.1	20%	85%	15%	20%	80%
	Residential	220	23500	19975	400	units	0.65	0.65	15%	25%	75%	70%	30%
	Private School	536	10000	8500	1200	Pupil	0.8	0.3	30%	85%	15%	0%	0%
	Retail	820	5000	4250	4250	/100m <sup>2</sup>	0.6	3.4	10%	65%	35%	50%	50%
	Ancillary		2000	1700	0	n/a	0	0	0	0	0	0	0

**Table 16: Trip Generation Rates AM & PM Peak Hour**

Precinct	Land Use	Code	AM Trips			PM Trips		
			IN	OUT	Total	IN	OUT	Total
<b>1</b>	Conferencing	780	4	0	5	0	0	0
	Hotel	310	38	26	64	35	29	64
	Retail	820	47	25	72	204	204	408
	Restaurant	932	0	0	0	366	197	563
	Office	710	183	32	216	43	173	216
	Gym	492	74	74	148	169	113	281
	Escapes and deliveries		0	0	0	0	0	0
	Pavilion		0	0	0	0	0	0
	Residential	220	35	106	141	99	42	141
	<b>Sub TOTAL Precinct 1</b>			<b>382</b>	<b>263</b>	<b>645</b>	<b>916</b>	<b>757</b>
<b>2</b>	Office	710	540	95	635	127	508	635
	Residential	220	55	166	221	155	66	221
	Private School	536	571	101	672	0	0	0
	Retail	820	15	8	23	65	65	130
	Ancillary		0	0	0	0	0	0
	<b>Sub TOTAL Precinct 2</b>			<b>1182</b>	<b>370</b>	<b>1551</b>	<b>347</b>	<b>640</b>
<b>TOTAL DEVELOPMENT (PRECINCT 1 &amp; 2)</b>			<b>1563</b>	<b>633</b>	<b>2197</b>	<b>1263</b>	<b>1397</b>	<b>2660</b>

Based on the expected peak hour vehicle trips of this development as well as the peak periods of the surrounding road network it is evident that the weekday AM incoming and the PM outgoing traffic will influence the intersection analysis but that the total weekday AM and PM peak hour traffic will be similar.

## 6.2 Trip Distribution

The following distribution patterns of traffic for the Precinct 1 development is indicated in Figure 10. The Precinct 1 and 2 development's distribution is reflected in Figure 11 and all of these were assumed for the AM peak hour. The reverse of this assignment and distribution pattern is likely to occur in the afternoon PM peak period.



## 6.2.1 Precinct 1 with partially extended Road Network

The proposed traffic distribution is shown in Figure 10. It should also be noted that some degree of access control or speed control needs to be exercised on the Link road through the development to discourage background traffic to use the Link as a through route.



Figure 10: Distribution on Partially extended Road Network

## 6.2.2 Precinct 1 and 2 with Future Road Network

The proposed traffic distribution for the future Road Network is shown in Figure 11. Access control or speed control on the Link road is not required after full extension of Berkley Road to Malta Road.



Figure 11: Distribution on Future Road Network





# 7 Development Traffic Analysis: Partially Extended Network

## 7.1 General

The impact of the development traffic on the partially extended road network was evaluated for the following scenarios:

Table 17: Traffic Scenarios for Partially Extended Network

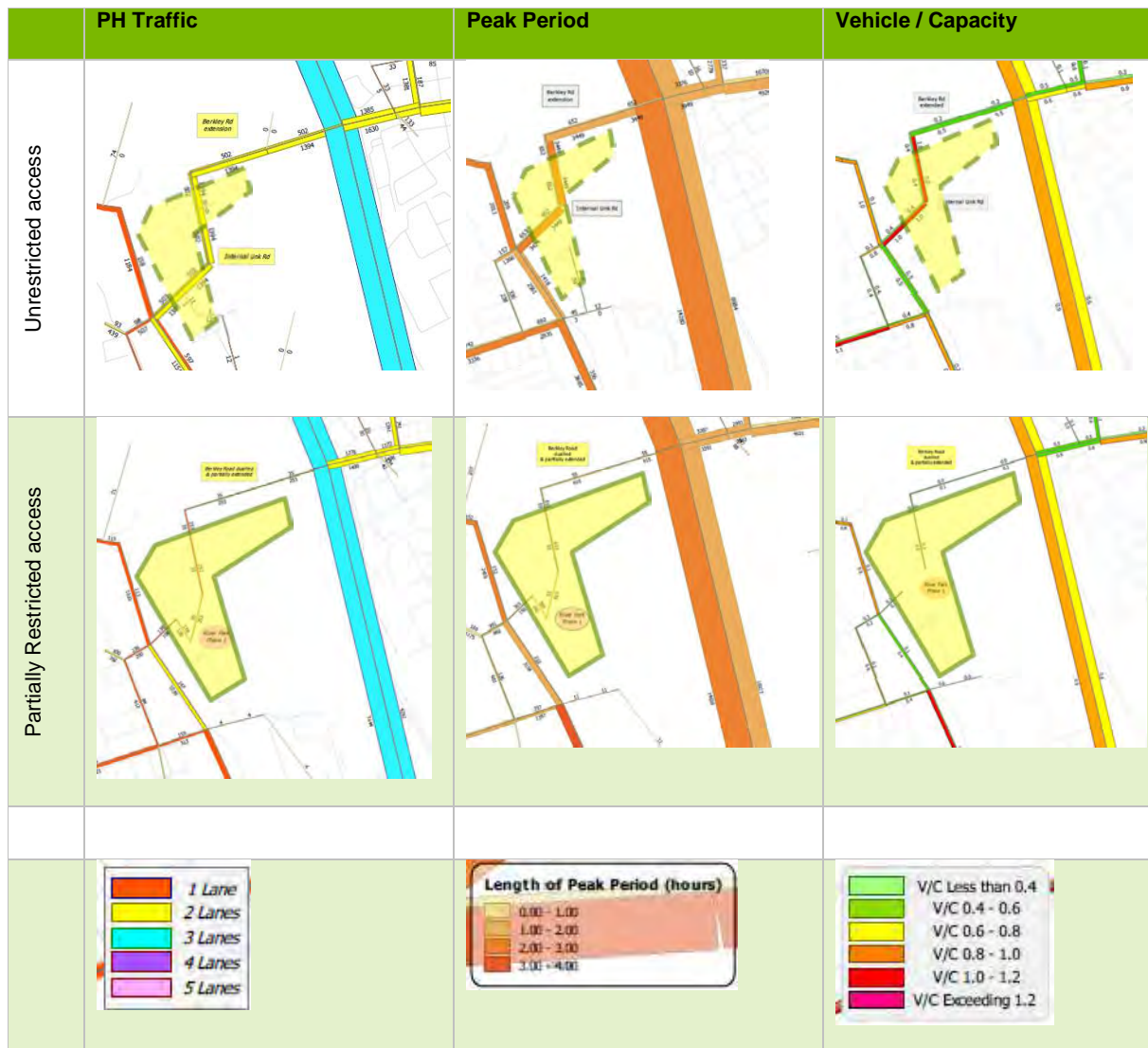
Scenario	Description	Image	Remark
Ex1	Precinct 1 traffic with Berkley Road extended partially		
Ex2	Precinct 1 and 2 traffic with Berkley Road extended partially		

## 7.2 Network Modelling: Partial Network

Two conditions were evaluated:

- Introduction of the link road through the development without any restrictions on access or speed.
- The traffic through the link road with access control and restricted speed.

Table 18: Modelling Results for 2017 Traffic on Partially Extended Network



It can be concluded that:

- With no access control or restrictions applied:
  - A significant volume of traffic will use the M5 / Liesbeek Link if it is constructed without the development; and
  - A 4-lane road will be required to meet the demand.
- Liesbeek Road south of the development will experience lower traffic volumes.

- If the link road is provided with access control / limitations then the volumes will be similar to the 2017 traffic on the existing network.

As the extent of the control / limitations through the development is not defined, it is assumed that a 2-lane road will initially be provided and that this road will reach capacity during peak periods.

It is also assumed that the peak periods as predicted by the model will be applicable and that these peak periods could be extended if other links (such as Berkley extension, Liesbeek Parkway) are not upgraded.

## 7.3 Intersection Analysis

The traffic conditions at the intersections considered are provided in Table 18 and Table 19 for Scenarios Ex1 and Ex2. The SIDRA results for the analysed intersections are shown in Appendix E.



### 7.3.1 Scenario Ex1 Intersection Conditions

Table 19: Traffic Conditions for Scenario EX1 on Partially Extended Network

Year	Traffic Conditions
2017	
2022	



### 7.3.2 Scenario Ex2 Intersection conditions

Table 20: Traffic Conditions for Scenario EX2 on Partially Extended Network

Year	Traffic Conditions
2017	
2022	






# 8 Traffic Analysis Future Network

## 8.1 General

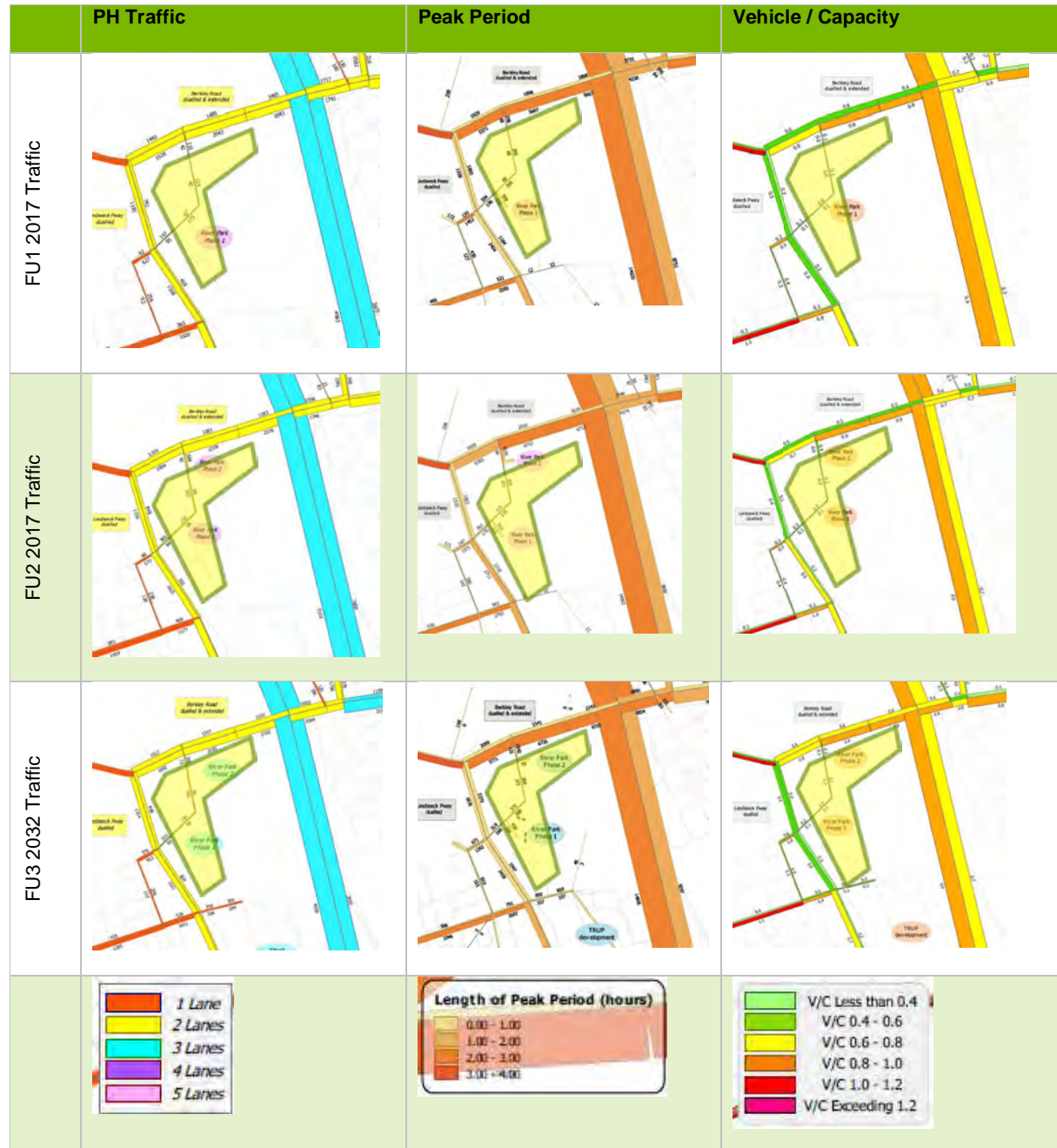
The impact of the development traffic on the road network was evaluated for the following scenarios:

Table 21: Traffic Scenarios on Fully Extended Network

Scenario	Description	Image
Fu1	Precinct 1 traffic with Berkley Road extended Fully to Malta Road	
Fu2	Precinct 1 and 2 traffic with Berkley Road extended Fully to Malta Road	
Fu3	Precinct 1 and 2 traffic with expected TRUP traffic with Berkley Road extended Fully to Malta Road	

## 8.2 Network Modelling: Infrastructure Scenario Modelling

Table 22: Modelling Results for Traffic on Future Network



It can be concluded that:

- The network is able to carry the proposed development including the Pragmatic Densification provided certain upgrades are implemented; and
- There is not a significant difference between the various Scenarios. The 2032 traffic is similar due to the increase in the use of Public Transport.



## 8.3 Intersection Analysis

### 8.3.1 Scenario Fu1 Intersection conditions

Table 23: Traffic Conditions for Scenario Fu1 on Fully Extended Network

Traffic	Traffic Conditions
2017	The 2017 traffic conditions were not tested as it is unlikely that the full network will be completed before 2022
2022	The 2022 traffic conditions were not tested for Scenario Fu1 as the intersections will experience less traffic than Scenario Fu2. Scenario Fu2 traffic conditions is given in paragraph 8.3.2 below

### 8.3.2 Scenario Fu2 Intersection conditions

Table 24: Traffic Conditions for Scenarios Fu2 on Fully Extended Network

Traffic	Traffic Conditions
2017	The 2017 traffic conditions were not tested as it is unlikely that the full network will be completed before 2022
2022	



### 8.3.3 Scenario Fu3 Intersection conditions

Table 25: Traffic Conditions for Scenarios Fu3 on Fully Extended Network

Traffic	Traffic Conditions
2032	

From this scenario it is concluded that the Road network will be able to accommodate the anticipated Pragmatic Densification developments.

## 9 Proposed Upgrading

### 9.1 Demand Summary

The demand for intersections and links are given in the tables below:

## 9.1.1 Intersections

The intersections traffic conditions are listed below in Table 26 for the development implementation stages.

**Table 26: Summary of Intersection Traffic Conditions**

Intersection	Geometry	Network											Remark	
		Existing			Partial				Full					
		Traffic												
		2017 Count	2017 Model	2022 Count	2017 Model	2017 EX1	2022 EX1	2017 EX2	2022 EX2	2022 Model	2017 FU1	2022 FU2	2032 FU3	
1 N2	Exist	B/C	F/F	B/D	F/F	F/F	F/F	F/F	F/F	F/F		F/F		
	Upgr 1	n/a	n/a	n/a		B/C	B/F	C/F	D/F					Required for EX1
	Upgr 2	n/a	n/a	n/a			B/C	C/C	B/C			B/C	B/B	Required for EX2
2 Station	Exist	B/C	B/D	C/C	F/F	F/F	F/F	F/F	F/F	C/C				
	Optimised	n/a	n/a		B/C	B/C	B/C	C/D	D/C	B/C		B/C	F/F	Only Optimization required for EX1 and EX2
	Upgr 1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a			D/C	
4 Link	Exist	A/B	B/C	A/B	E/C	F/F	F/F	F/F	F/F	F/F		F/F		
	Optimised	n/a	n/a	n/a	D/C									
	Upgr 1	n/a	n/a	n/a		B/C	C/F	C/F	D/F					
	Upgr 2	n/a	n/a	n/a		n/a	B/C	C/C	C/C			C/C	C/C	Required for EX1 and EX2

Intersection	Geometry	Network											Remark	
		Existing			Partial				Full					
		Traffic												
		2017 Count	2017 Model	2022 Count	2017 Model	2017 EX1	2022 EX1	2017 EX2	2022 EX2	2022 Model	2017 FU1	2022 FU2		2032 FU3
5 Malta	New Signal	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	B/C		D/D	D/C	
	New Circle	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	F/F		F/F		It appears that the large dominant turning volumes do not favour the Circle option
	New Circle slip	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	A/F		E/F		
6 Access	New Signal	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		B/C		Required only for extension of Berkley through to Malta Road
	New Circle	n/a	n/a	n/a	n/a	n/a	n/a					B/F		
7 & 8 M5	Exist	C/F	A/C	F/F	n/a	n/a	n/a	n/a	n/a	n/a		n/a	n/a	
	Upgr 1	n/a	n/a	n/a	C/C	C/C	C/F	D/D	C/F	F/F		F/F		
	Upgr 2	n/a	n/a	n/a	n/a	n/a	B/B	n/a	B/B	F/F		F/F	B/F	Required for EX1 and EX2
	Upgr 3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		C/E	C/D	
9 Internal							A		D					Worst case scenario was tested

## 9.1.2 Links

The lane demand on road links based on expected traffic conditions are given in Table 27:

**Table 27: Summary of Link Traffic Conditions**

Road	Link	Existing Lanes	Network												Remark
			Exist			Partial						Full			
			2017 Count	2017 Model	2022 Count	2017 Model	2017 EX1	2022 EX1	2017 EX2	2022 EX2	2022 Model	2022 FU1	2022 FU2	2032 FU3	
Liesbeek	N2 - Station	2	(1560) 4-lane	(1654) 4-lane	(1698) 4-lane	(1300) 2-lane	(2395) 4-lane	(2022) 4-lane	(2167) 4-lane	(2394) 4-lane	(1201) 2-lane	(1987) 4-lane	(2063) 4-lane	(1830) 4-lane	Dualling already required
	Station - Link (Part)	4	(819) 2-lane	(1012) 2-lane	(882) 2-lane	(1150) 2-lane	(1500) 4-lane	(1674) 4-lane	(1928) 4-lane	(2104) 4-lane	(790) 2-lane	(1506) 4-lane	(1615) 4-lane	(1521) 4-lane	Dualling required for EX1 and EX2
	Link - Malta	2	(457) 2-lane	(947) 2-lane	(617) 2-lane	(1184) 2-lane	(1124) 2-lane	(1362) 2-lane	(1346) 2-lane	(1496) 2-lane	(868) 2-lane	(1181) 2-lane	(1150) 2-lane	(1314) 2-lane	Dualling can only be implemented with Berkley /Malta intersection
Berkley	M5 - Access	n/a	n/a	n/a	n/a	(1394) 2-lane	(959) 2-lane	(1220) 2-lane	(1477) 2-lane	(1744) 4-lane	(2156) 4-lane	(2043) 4-lane	(2378) 4-lane	(2193) 4-lane	2-lanes required for partial completion of Berkley Road.
	Access - Malta	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	(2156) 4-lane	(1928) 4-lane	(1894) 4-lane	(1882) 4-lane	Once implemented dualling required.
Internal Road	Access - P1	n/a	n/a	n/a	n/a	(1394) 2-lane	(959) 2-lane	(1219) 2-lane	(1612) 4-lane	(1744) 4-lane	n/a	(115) 2-lane	(564) 2-lane	(365) 2-lane	2-lane will generally be sufficient
	P1 - Liesbeek	n/a	n/a	n/a	n/a	(1385) 2-lane	(917) 2-lane	(1449) 2-lane	(1374) 2-lane	(1493) 2-lane	n/a	(147) 2-lane	(365) 2-lane	(255) 2-lane	2-lane will suffice

Note: Maximum directional volume shown in brackets for AM or PM.

It appears that for the development of Precinct 1 and 2:

- Dualling of Liesbeek Parkway south of Station Road is already required with existing traffic and therefore not triggered by the development but considered as backlog upgrades which is due;
- Liesbeek Parkway should be dualled between Station Road and Link Road to improve traffic conditions between the Station and Link Road intersections;
- Dualling of Liesbeek parkway between Link Road and Malta Road is not required by the development but it will be required once the Malta / Berkley / Liesbeek intersection is upgraded to facilitate turning lanes between the two intersections;
- The Partial completion of Berkley Road requires a 2-lane road but the full extension of Berkley road requires a 4-lane road; and
- A 2-lane link road through the development will be close to capacity until Berkley Road is extended to Malta Road. Thereafter the traffic volumes will drop due to elimination of external through traffic.

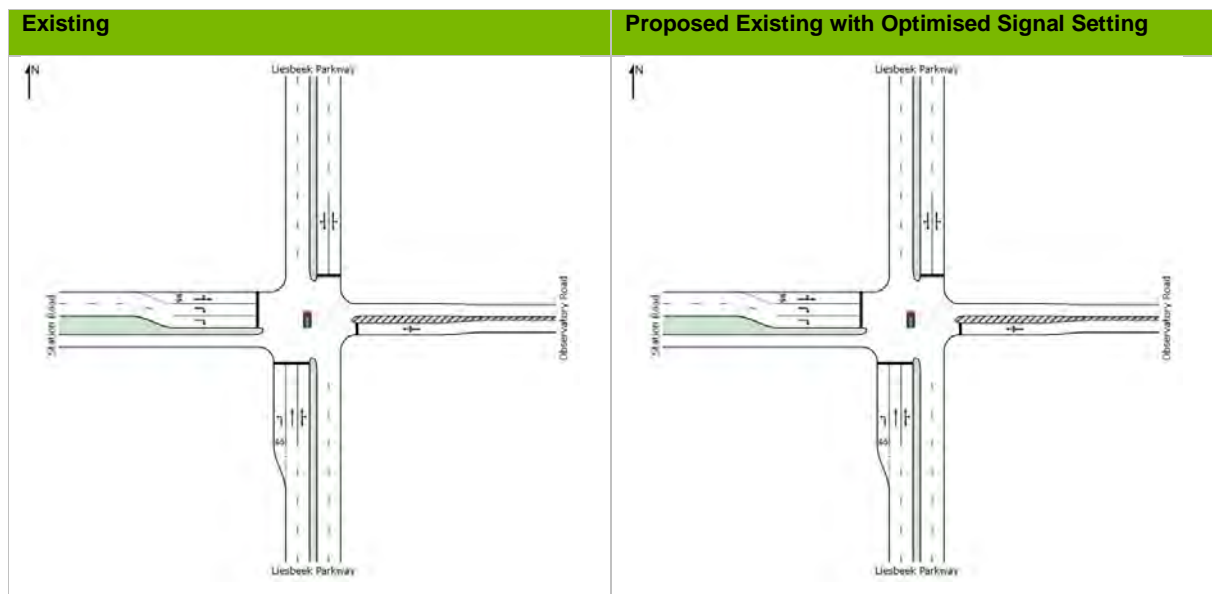
## 9.2 Precinct 1 Road Infrastructure Requirements

### 9.2.1 Intersections

The existing geometric layout and the proposed upgrading for each intersection is given below:

#### Intersection 2: Station Road / Liesbeek Parkway

The intersection should be upgraded to the Upgrade 1 geometric layout.



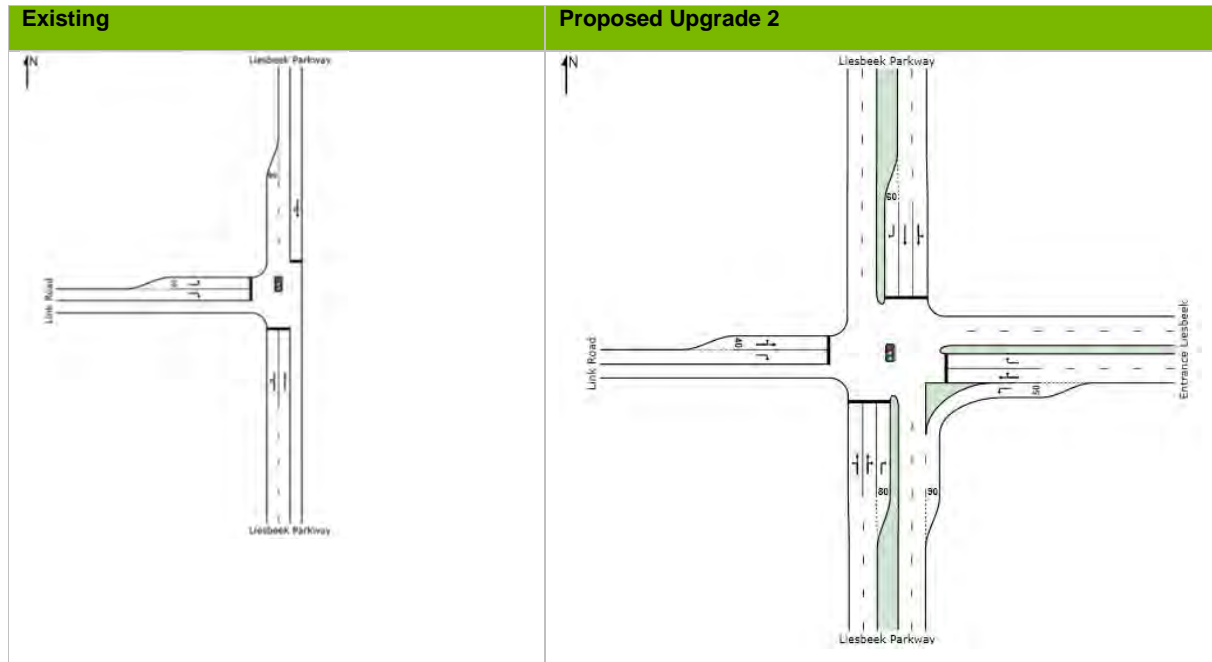
The upgrades include:

- Signal Optimization



## Intersection 4: Link / Liesbeek Parkway

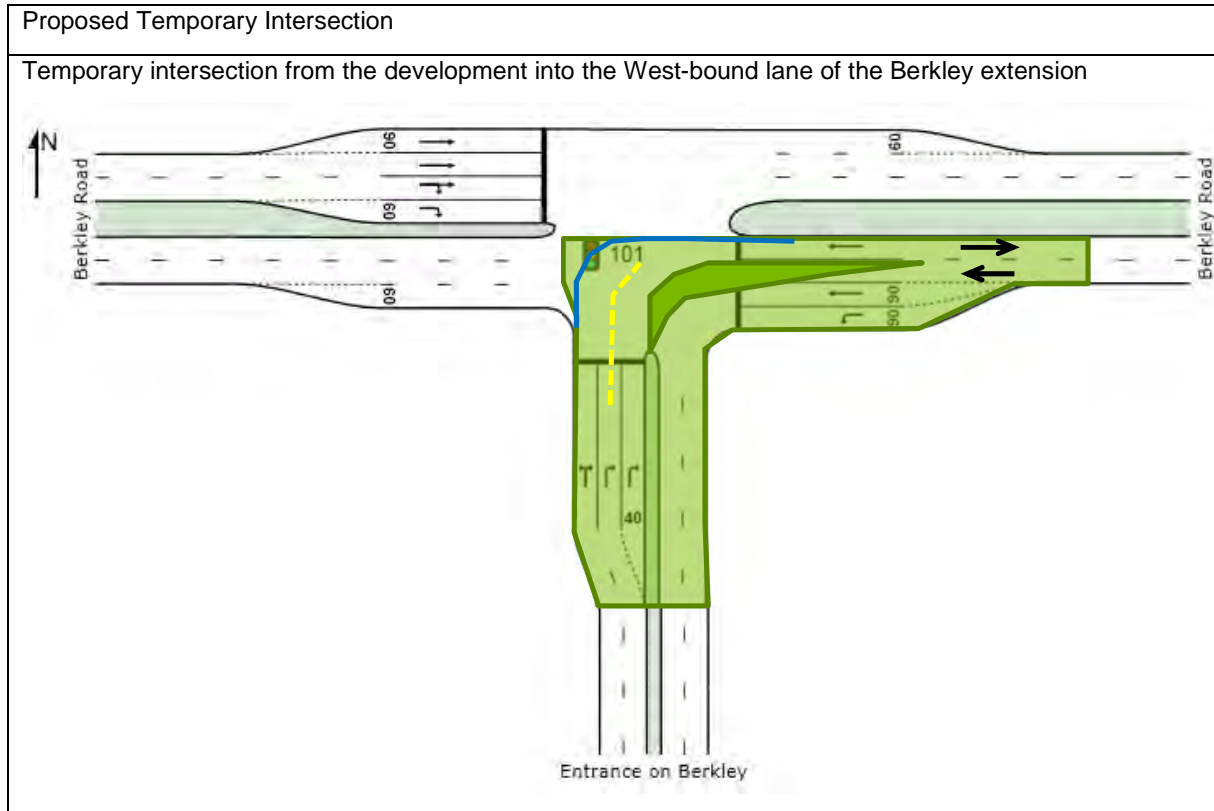
The intersection should be upgraded to the Upgrade 2 geometric layout.



The upgrades include:

- Northern leg
  - Additional through lane on approach and turning lane
  - Extension of the merging lane on departure
- Eastern Leg
  - New approach into development with two lanes in and out and slip lane to the south
- Southern Leg
  - Additional Turning lane on approach
  - Additional through lane and merging lane on departure

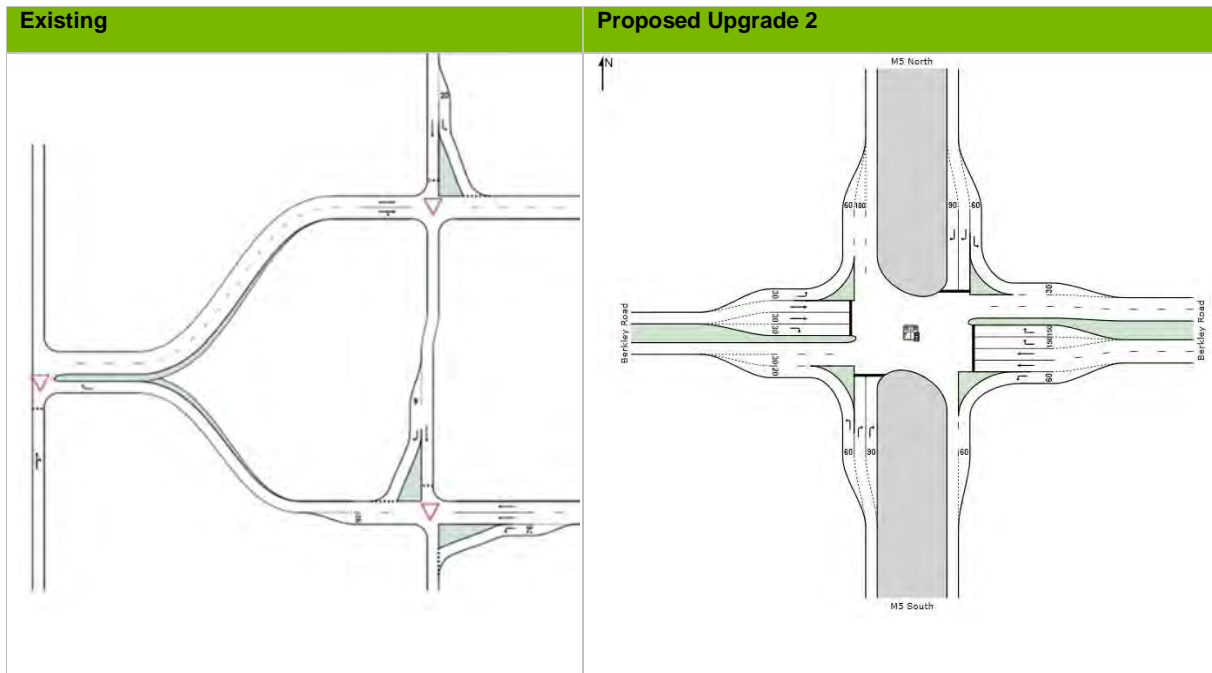
## Intersection 6: New Access Berkley Road Extension



The upgrades include:

- Portion of the new intersection shown
- Full Approach from development

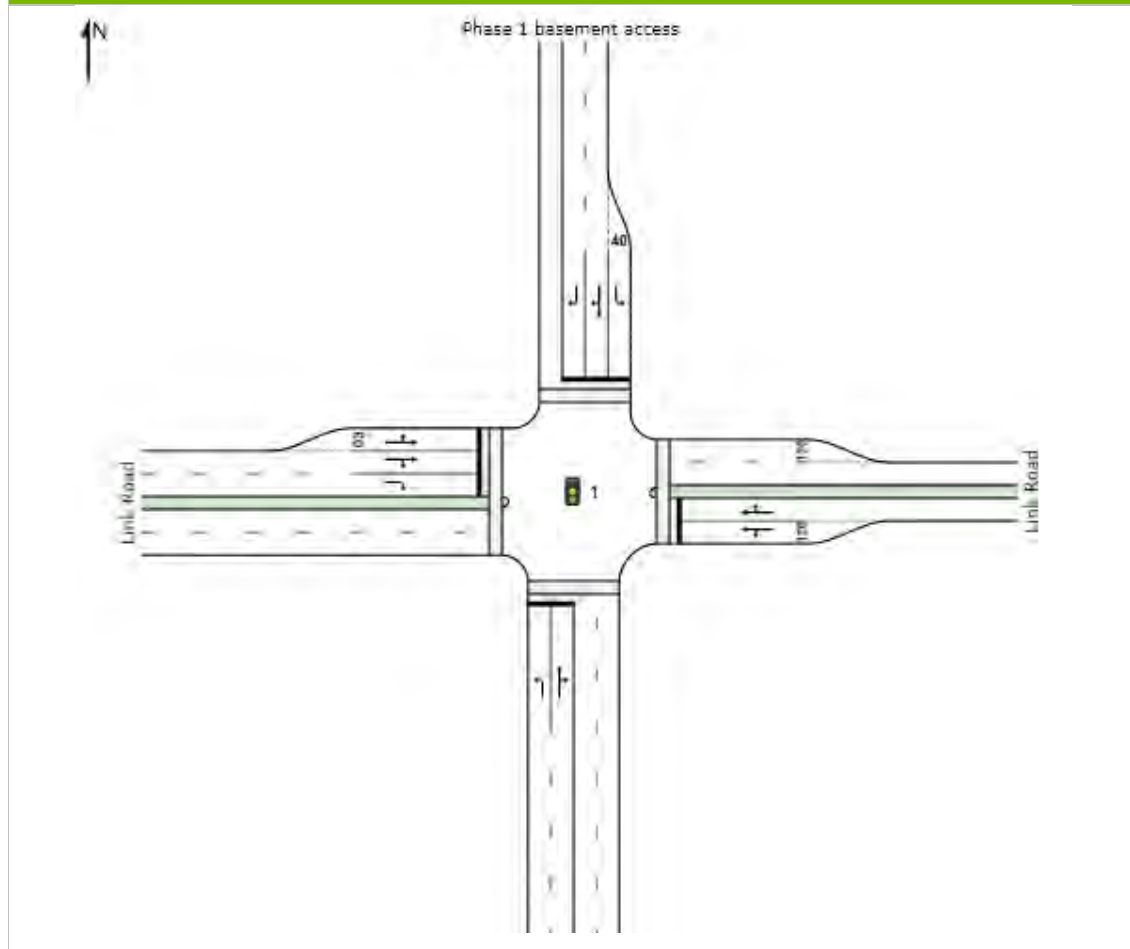
## Intersection 7 & 8: M5 / Berkley Road



Upgrade full intersection to a single point interchange as indicated.

## Intersection 9: Link Road internal intersection

### Proposed Intersection



The upgrades include:

- Full intersection

## 9.2.2 Roads

The following Road improvements are required for the development of Precinct 1 and 2:

- Liesbeek Parkway should be dualled between Station Road and Link Road;
- The Partial completion of Berkley road as a 2-lane road;
- A 2-lane link road through the development with appropriate widening at intersections; and
- Required other internal roads.

## 9.3 Precinct 2 Road Infrastructure Requirements

### 9.3.1 Intersections

The following is required:

- Two new Left-In Left-Out intersections

### 9.3.2 Roads

Apart from intersection lane upgrading, the West Bound Carriageway of Berkley Road should be extended to the Western Left-In Left-Out intersection.

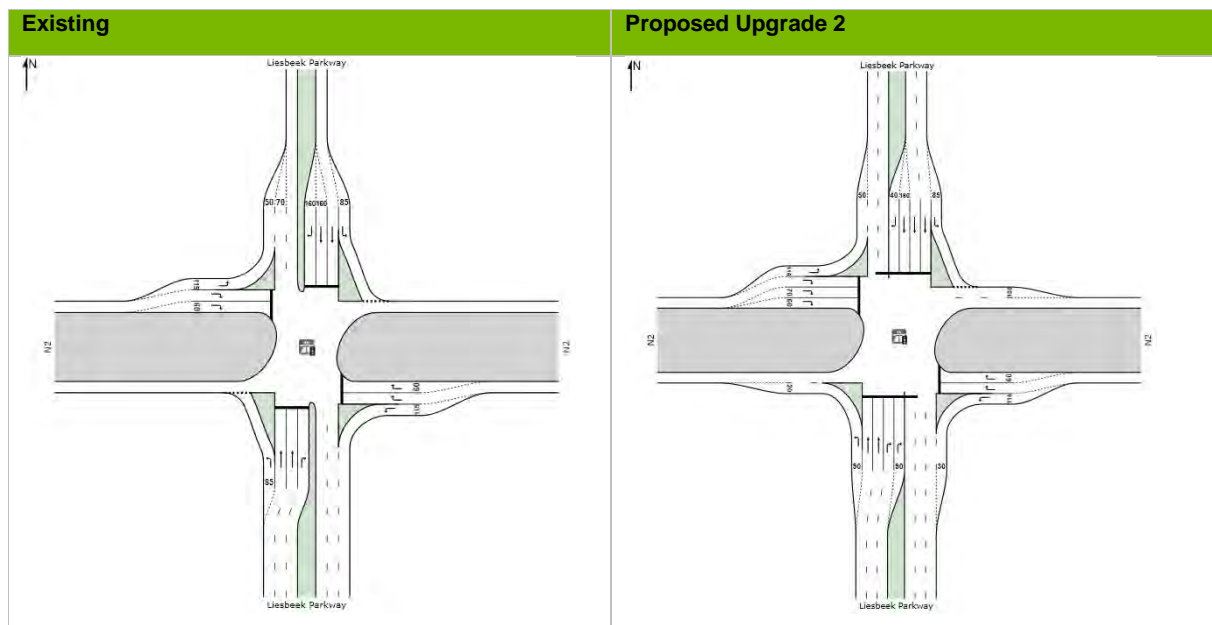
## 9.4 Future Network Infrastructure Requirements

The road infrastructure required for existing and long-term capacity should be implemented by others to improve traffic conditions once contributions are available from other developments in the area. If these elements are not provided, then the peak periods will extend at times.

### 9.4.1 Intersections

#### Intersection 1: N2 / Liesbeek Parkway

The intersection should be improved to the Upgrade 2 geometric layout.



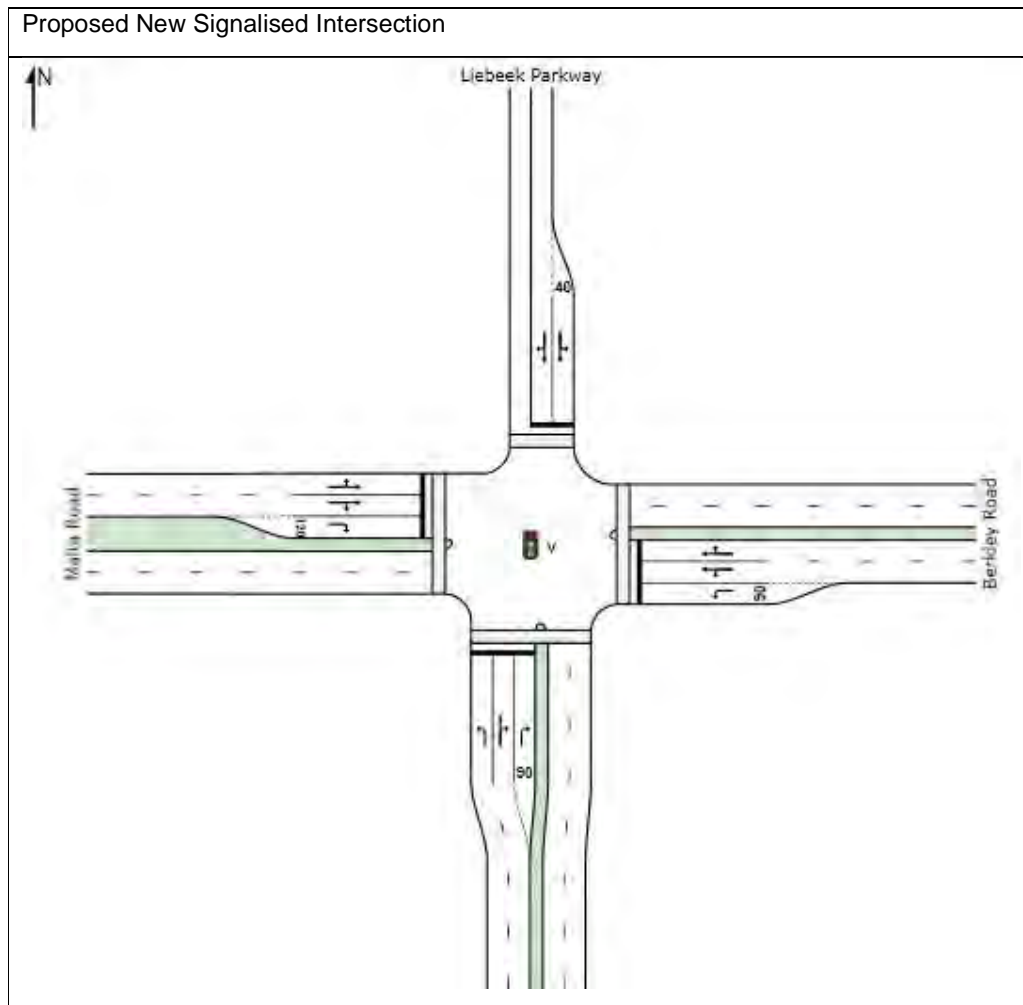
The upgrades include:

- Western leg
  - Additional Right Turning lane on approach
  - Merging lane on departure



- Northern leg
  - Additional through lane on approach
- Eastern Leg
  - Merging lane on departure
- Southern Leg
  - Additional Right Turning lane on approach
  - Additional through lane on departure

### Intersection 5: Malta / Liesbeek Parkway / Berkley

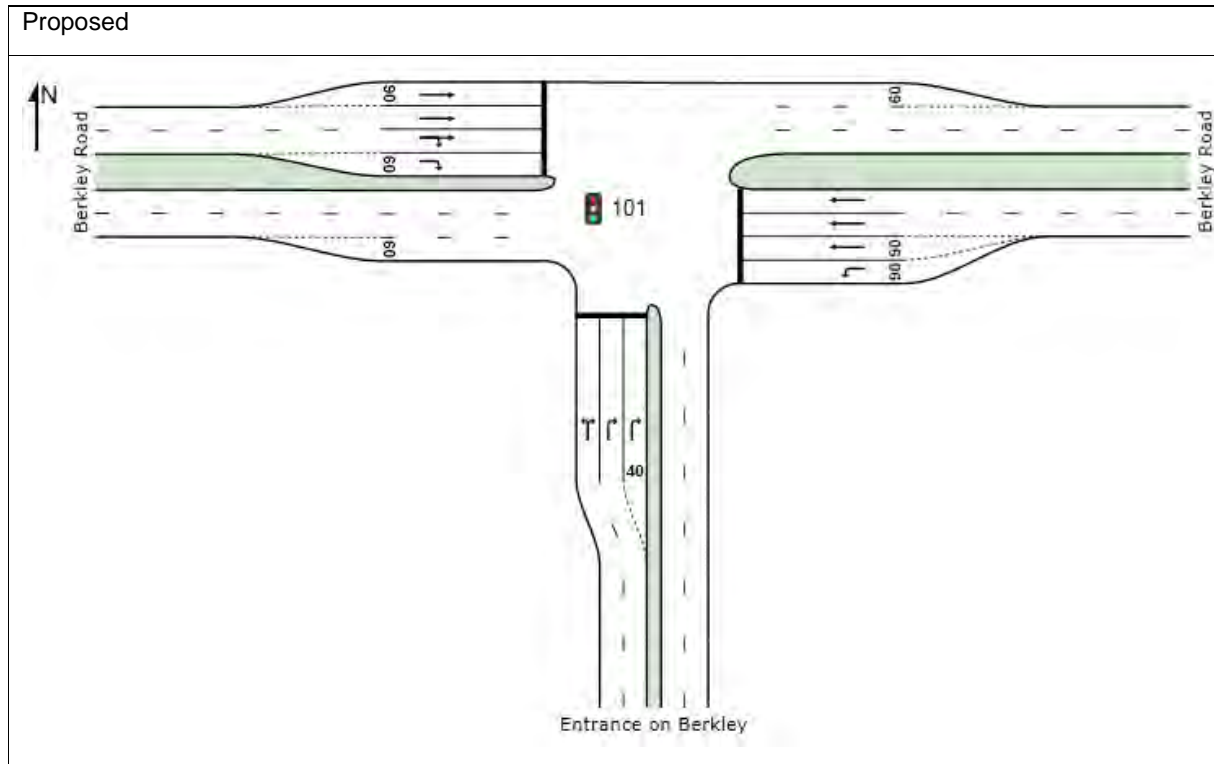


The upgrades include the construction of a new signalised intersection with:

- Western leg
  - Full new approach and departure
- Northern leg
  - New Access for PRASA development
- Eastern Leg
  - Full new approach and departure

- Southern Leg
  - Full new approach and departure

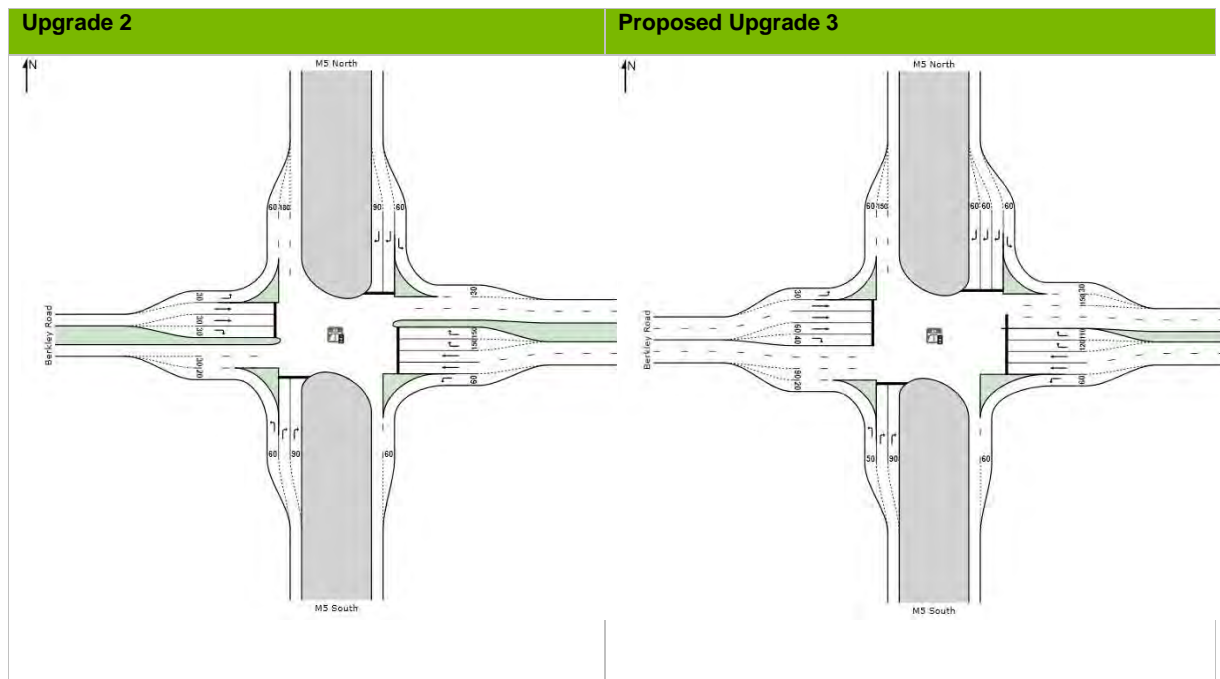
### Intersection 6: New Access Berkley Road Extension



The upgrades include the construction of a new signalised intersection with:

- Western leg
  - Full new approach and departure
- Eastern Leg
  - Full new departure
- Southern Leg
  - Full new approach and departure

## Intersection 7 & 8: M5 / Berkley Road



The upgrades include:

- Northern leg
  - Additional Right Turn lane on approach
- Western leg
  - Additional merging lane on departure

### 9.4.2 Roads

The following Road improvements implemented by others are required in the long term:

- Dualling of Liesbeek Parkway between the N2 and Station Road;
- Dualling of Liesbeek parkway between Link Road and Malta Road can only be implemented on completion of the Malta / Liesbeek / Berkley intersection; and
- The full extension of Berkley road requires a 4-lane road.

# 10 Construction Phasing & Traffic

The impact of the construction on the existing traffic is discussed in this chapter.

It is proposed to implement the two precincts in 4 construction phases as follows:

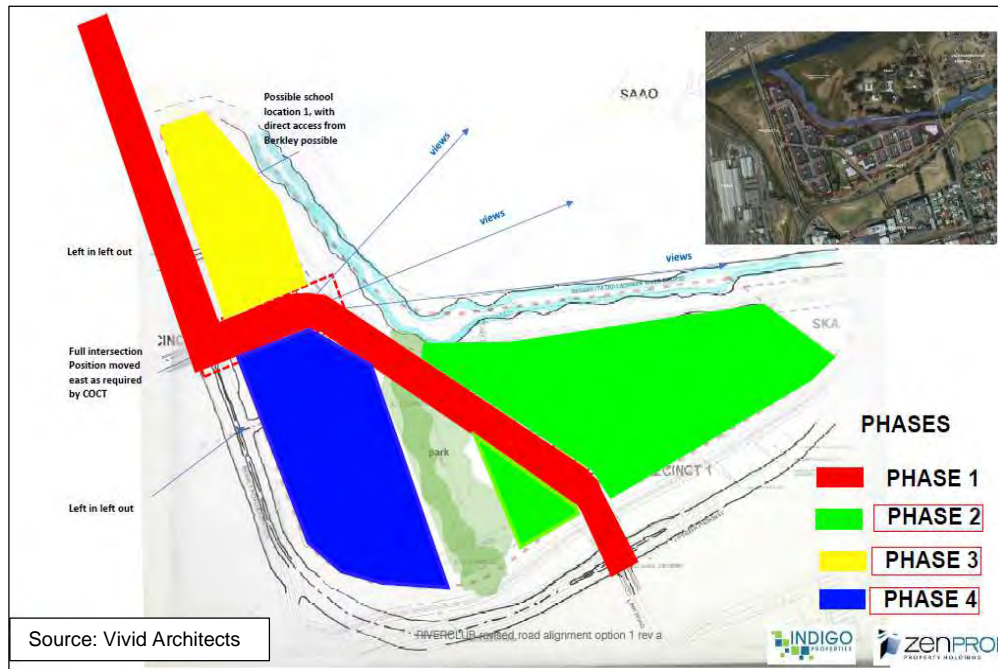


Figure 12: Proposed construction Phases

Precinct 1 includes construction Phases 1 and 2 while Precinct 2 includes Phases 3 and 4 as illustrated in Figure 12.

## 10.1 Precinct 1

The construction impact on traffic is as follows:

- The construction materials will initially be transported via Liesbeek Parkway in absence of the proposed bridge crossing of the Black River. This will lead to increased traffic on Liesbeek Parkway but if the contractor is restricted to do hauling outside peak hours the impact will be significantly reduced.
- The upgrading of the M5 / Berkley Road intersection will have a significant impact on traffic on Berkley Road East but with appropriate traffic accommodation stages it could be mitigated.
- The upgrading of the Liesbeek Parkway / Link Road Access intersection will also have significant impact on the Liesbeek Parkway traffic. However, the fact that the intersection will have 4-lanes (2 per direction) at the intersection implies that by properly planned traffic accommodation stages, the impact could be mitigated.
- For the construction of Precinct 1 the material could be transported on the Berkley Extension, which will not be open to public traffic until completion of certain portions of Precinct 1.

## 10.2 Precinct 2

The construction impact of the implementation of Precinct 2 will be significant lower and limited to access control to the link road between the M5 and Liesbeek Parkway.



# 11 Public Transport and Non-Motorised Transport

## 11.1 Public Transport

Public transport services are available within the surrounding area of the proposed development. However, it is important that public transport for the proposed development is enhanced by extending existing services or provision of new services. Very importantly, a high quality NMT network leading to the public transport facilities, should be provided.

It is the intention that current public transport services, albeit low volume services or low frequencies, be supplemented with higher capacity vehicles at peak times where this should be justified. Also of importance is that the public transport system should be adaptable over time relating to the specific needs or passenger requirements as concluded in the TRUP initiatives.

As a result of the extent of the proposed development, alternative options for additional public transport capacity were investigated and these are discussed further in Section 11.1.2.

### 11.1.1 Existing Facilities

The proposed development site is served by various modes of public transport as indicated below and illustrated in Figure 13 further down.

- MyCiTi Bus Routes (although not close to the development)
- Metrorail Services
- Golden Arrow Bus Services
- Minibus-taxis

Table 28 illustrates the approximate distance from a station or a stop for the relevant public transport service to the proposed development.

#### **MyCiTi Bus Routes**

There are no MyCiTi routes serving the immediate environment or within the walkable catchment area. The closest MyCiTi route to the development is Feeder Route 102 with the closest bus stop located in Spencer Road (near the Salt River Rail station) to the north-west of the development which is not within acceptable walking distance from the development. It is more than 1km from both the access locations for Precincts 1 and 2 on Liesbeek Parkway and the future Berkley Road extension respectively. As part of Phase 1 of the MyCiTi system, Feeder Route 102 serves Salt River Station and the associated residential areas and the Cape Town CBD.

#### **Metrorail Services**

The Metrorail train services have previously been the most popular mode, however the numbers have declined in recent months. The Observatory train station is located approximately 600m from the Link Road/Liesbeek Parkway access to the development.

#### **Golden Arrow Bus Services (GABS)**

GABS have an existing route along Liesbeek Parkway west of the development from the south towards Malta Road in the north with only one stop location noted in Liesbeek Parkway northbound. Station Road is also a GABS route. However, according to the TDAs Transportation Reporting System (data year 2016) there are no GABS bus stops along Liesbeek Parkway.

## Minibus-taxis

Minibus taxi routes exist in Liesbeek Parkway on the section south of the development and also into Station Road, Main Road (south to north) and Voortrekker Road that is an east-west route. A summary of all the existing services and approximate walking distances is indicated in Table 28.

**Table 28: Existing public transport modes – distances and walking time**

Mode	Distance	Walking Time
GABS	+/-100m	+/-2mins
MyCiTi (closest feeder stop)	>1000m	>15mins
Metrorail (Observatory)	550 – 600m	8-10 mins
Metrorail (Salt River)	>1000m	>15mins
Minibus taxi	+/-100m	+/-2min

### 11.1.2 Proposed Facilities

As previously indicated, additional public transport capacity or alternative options will be required. During the engagement process with TDA (PPO: Systems Planning & Modelling), it was confirmed that according to the Council's approved Integrated Public Transport Network (IPTN) 2032 plan (approved in May 2014), the nearest trunk / distributor route is D12 – a route linking the Metro South East to Cape Town CBD via Klipfontein Road. D12 is planned to run along Main Road west of the proposed development, which is not within acceptable walking distance. Therefore, feeder services would be required to link the proposed development to this route. According to the approved IPTN 2032 Implementation Plan, Route D12 is listed as one of the top 5 priorities for the implementation.

Feeder services are therefore not excluded and may be an option, but the demand must be justified by passenger numbers and by other developments within the immediate vicinity. The Station Road to Ndabeni Train Station route, described as a feeder route, is mentioned in the TRUP initiative however this particular link across the M5 is most likely to be far into the future when other TRUP developments arise and a demand is justified.

TDA confirmed that "broader planning will be done later when more information is available of other proposed developments within the TRUP area". However, the following options with respect to Public Transport may be considered by TDA and other stakeholders for the proposed Precincts 1 and 2 of the development as illustrated in Figure 13:

#### Precinct 1:

It is expected that Precinct 1 will generate a certain amount of public transport users with up to 39% of the mode share during the later stages. To accommodate this demand, the following options are proposed for consideration:

- A potential taxi route from the east (Maitland Station) into Berkley Road, through the development and connecting with Liesbeek Parkway, Station Road, Observatory Station and Main Road;
- The existing GABS route for use in Liesbeek Parkway (to/from Malta Road) and Station Road; and
- A potential MyCiTi feeder route extension (Route 102) from Salt River Station (Spencer Road) into Malta Road, Liesbeek Parkway, Station Road, Observatory Station and linking with Main Road (future D12 Trunk route) where demand justifies this. This was discussed with TDA and should be investigated further when required.

## Precinct 2:

To accommodate the possible future demand that the Precinct 2 development may have (additional demand of Precinct 2 but inclusive of Precinct 1), the following long-term planning proposals should be considered:

- A possible MyCiTi future feeder route along Berkley Road extension pending future planning outcomes;
- A MyCiTi trunk route T04 from the north may be altered and then be linked to serve Maitland Station (where other services connect to serve the development);
- A potential MyCiTi feeder route extension (Route 102) from Salt River Station (Spencer Road) into Malta Road, Liesbeek Parkway, Station Road, Observatory Station and linking with Main Road (future D12 Trunk route) where demand justifies;
- A potential taxi route from the east (Maitland Station) into Berkley Road that is not going through the development but rather connecting with Malta Road, Liesbeek Parkway, Station Road, Observatory Station and Main Road; and
- The existing GABS route for use in Liesbeek Parkway (to/from Malta Road) and Station Road.

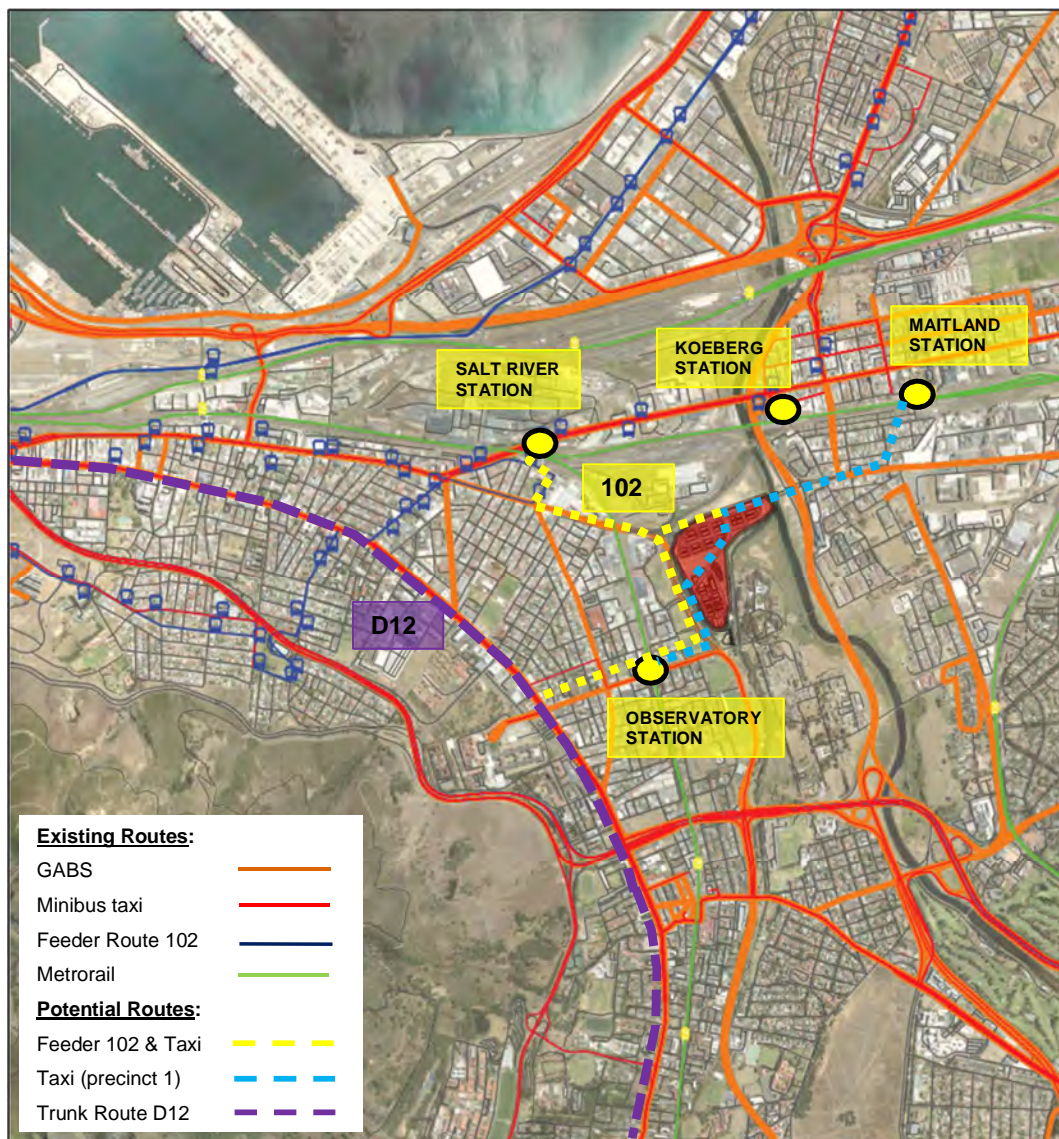


Figure 13: Existing & Proposed Public Transport Routes in the vicinity



Figure 14 below indicates various proposals of internal stop locations/bays for public transport for the proposed development. For the partial completion of Berkley Road (only up to the main entrance in Berkley Road), a public transport route is proposed through the development.

For the full completion of Berkley Road, the route is proposed along Berkley Road to Liesbeek Parkway (green line) and not through the proposed development. Potential MyCiTi stop locations should be ideally on the downstream side at the proposed Berkley Road main access and at the proposed access in Liesbeek Parkway, as indicated in the figure below.

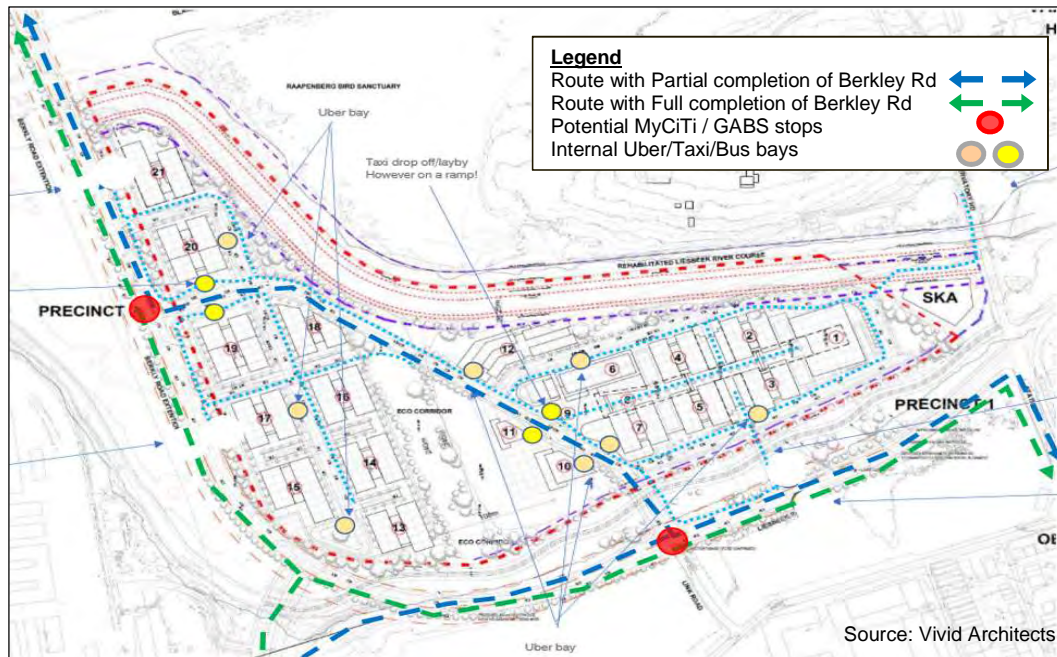


Figure 14: Proposed public transport locations, stops and routes

## 11.2 Non-Motorised Transport (NMT)

### 11.2.1 Existing Facilities

A dedicated cycle lane exists on the western side of Liesbeek Parkway from the intersection with Station Road northbound towards Malta Road. Existing sidewalks (up to 3m wide) exists on the eastern side of Liesbeek Parkway at the same section as above, and it is shared with bicycles.

Observatory Road has narrow sidewalks on both sides. Station Road also has sidewalks on both sides for pedestrians. Crossing facilities exist at the major intersection of Liesbeek Parkway with Station Road and also at the Liesbeek Parkway / Link Road intersection.

### 11.2.2 Proposed Facilities

NMT will play a big role in the daily activities of the future residents and activities in this area. New NMT facilities and infrastructure will be required as a result of the increased number of pedestrians (walking and public transport) and cyclists that are expected at the development. All new sidewalks should ideally be a minimum of 2.0m wide and any proposed pedestrian facilities should be Universally Accessible (UA) when implemented with adequate lighting for night conditions.



It is recommended that NMT routes, i.e. sidewalks and cycle paths are provided along the full extent of Berkley Road and the proposed realignment of Liesbeek Parkway with adequate UA compliant crossing facilities at the proposed signalised intersections and the proposed new accesses. Refer to Figure 15 with the existing TRUP routes and desire lines, as well as the proposed routes within Liesbeek Parkway and Berkley Road.

NMT facilities within the development for walking and cycling should also be accommodated for along the street network. Bicycle facilities such as cycle routes and locking facilities are important to encourage cycling and to make it more attractive and to establish a cycling culture. Wayfinding signs are also very important to provide information/guide NMT users and should be placed at strategic areas internally within the development and externally within the public domain where NMT infrastructure is proposed.

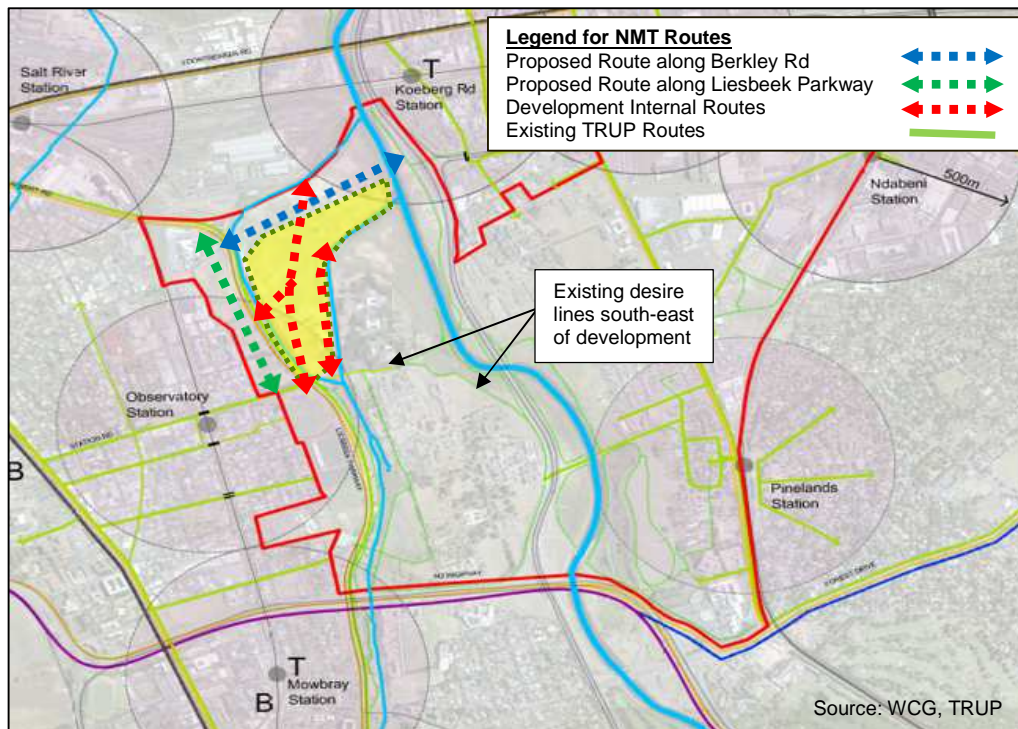


Figure 15: Existing TRUP NMT routes and proposals

## 12 Parking

The River Club development is located within the ‘standard area’ within the City of Cape Town in terms of off-street parking requirements and the boundaries are illustrated in Figure 16. As a result of the proposed development being the first within the “TRUP” area, high levels of parking supply are still expected. Serious consideration was given to mitigate this by applying the parking strategy as per the TRUP initiatives where possible.

The TRUP strategy is to minimise total parking supply, to develop shared parking, and to configure some parking for future conversion to other uses. A component of off-site parking is required and, for this development, the two proposed Precincts will each require their own off-street parking.

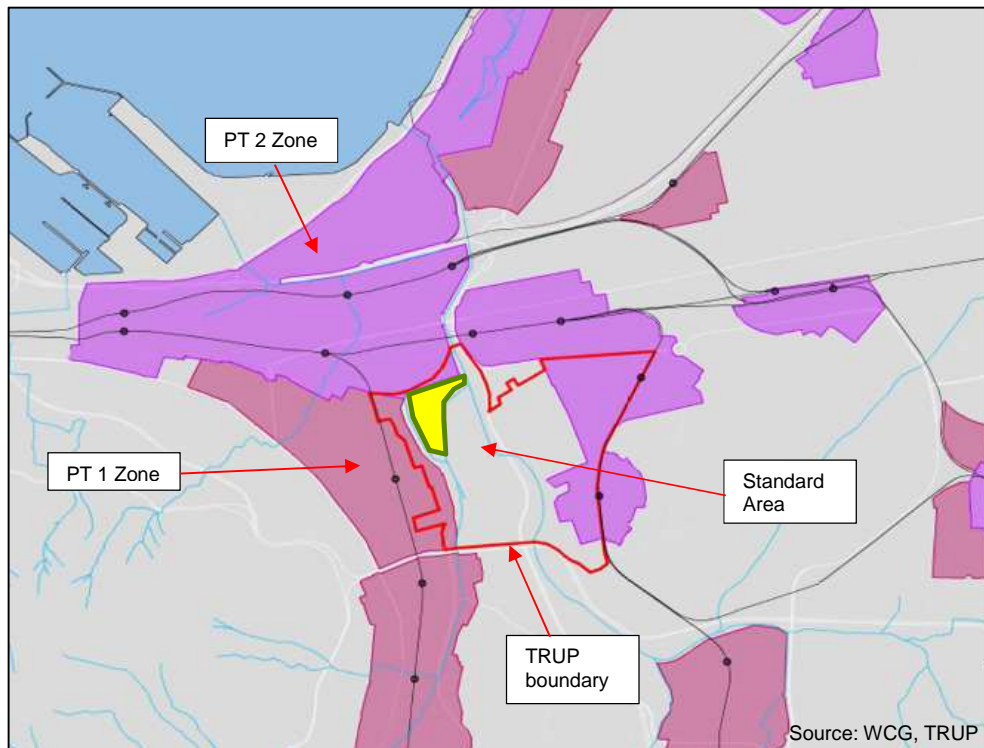


Figure 16: Area Classification for Off-street Parking

Mechanisms such as Travel Demand Measures (TDM) strategies are required and is proposed for higher ratios than the targets set in the TRUP initiatives. Strategies include enhancement of public transport and various modes thereof, cycling and walking. This is to minimise the reliance on private cars and monitor usage, and then excess supply could either be converted to other uses or made available to occupants of other sites i.e. shared parking. As per the TRUP initiatives, the maximum 'package of parking' shall be agreed with the City of Cape Town.

The minimum off-street parking requirements per relevant land-use type within this area of Cape Town is illustrated in Table 29. By using the minimum parking ratios for the 'standard area' (as per the table below), the minimum number of parking bays required is **3221** and **2628** for Precinct 1 and 2 respectively totalling **5849** parking bays.

Table 30 proposes the parking bays per Precinct level and specific basement level. The parking that is proposed for Precinct 1 totals **1829** bays and is **1392** bays less than the requirement. The parking proposed for Precinct 2 totals to **2972** bays and is overprovided by **344** bays. The full development therefore provides a total of **4801** parking bays - a reduced total of **1048** parking bays - and confirms that the development is considering parking reduction as per the TRUP initiatives.

**Table 29: Minimum off-street parking Requirements for 'standard area' (CTZS)**

Precinct	Description	GLA (m <sup>2</sup> )	Standard Area Minimum Ratios	Parking bays based on minimum
Precinct 1	Conferencing	1020 (400 Seat)	6bays/10 seats	240
	Hotel	6970	0.75bays/bedroom + 20	140
	Retail	13345	6/100 m <sup>2</sup>	801
	Restaurant	7820	2/25 m <sup>2</sup>	626
	Offices	12835	4/100 m <sup>2</sup>	513
	Gym	3485	10/100 m <sup>2</sup>	349
	Escapes and deliveries	1785	0	0
	Pavilion	850	5/100 m <sup>2</sup>	43
	Residential	7140	2/unit	510
<b>Precinct 1 Total</b>		<b>55250</b>		<b>3221</b>
Precinct 2	Office	37825	4/100 m <sup>2</sup>	1513
	Residential	19975	2/unit	800
	Private School	8500	1/classroom	60
	Retail	4250	6/100m <sup>2</sup>	255
	Ancillary	1700	0	0
<b>Precinct 2 Total</b>		<b>72 250</b>		<b>2628</b>
<b>Total Parking Bays for Precinct 1 &amp; 2</b>				<b>5849</b>

**Table 30: Proposed Precinct Parking Bay Provision**

Basement extents	Precinct 1 parking provision (bays)	Precinct 2 parking provision (bays)
Level p1	210	1372
Level p2	210	
Level p2-basement		1540
Level p3-basement	1349	
Surface	60	60
<b>per Precinct Total</b>	<b>1829</b>	<b>2972</b>
<b>Combined Total</b>	<b>4801</b>	

# 13 Concluding Remarks and Recommendations

## 13.1 Conclusions

The following conclusions are made:

### Status Quo of road network

- The existing intersections within the study area reveals acceptable LOS, however the existing road network is reasonably congested during peak hours;
- The AM peak hour is between 07:45 – 08:45 and the PM peak hour between 16:15 – 17:15.

### Development Scope

- Precinct 1 consists of mixed-use land uses such as a hotel, retail, offices, residential components, restaurants, conferencing, a gym and a stand-alone pavilion with a total bulk of 65 000 m<sup>2</sup>.
- Precinct 2 also consists of mixed-use land uses such as offices, retail, residential and a private school with a total bulk of 85 000 m<sup>2</sup>.

### Trip Generation

- The expected trip generation of the Precinct 1 development is as follows:
  - AM Peak hour: 645 total trips; 382 inbound, 263 outbound
  - PM Peak hour: 1673 total trips; 916 inbound, 757 outbound
- The expected trip generation for the Precinct 2 development is as follows:
  - AM Peak hour: 1551 total trips; 1182 inbound, 370 outbound
  - PM Peak hour: 987 total trips; 347 inbound, 640 outbound

### Existing & Proposed Access Arrangements

- An access exists within Observatory road but will not be used for the development;
- Precinct 1: A signalised access within Liesbeek Parkway opposite Link Road; a signalised access in Berkley Road 365m from the M5; a left-in, left-out access 90m east of the signalised Berkley Road access;
- Precinct 2: the same access points as Precinct 1, with the addition of another left-in, left-out access 90m west of the signalised Berkley Road access (if the road is extended to Malta road);
- Measures to restrict through traffic (rat-running) for the Precinct 1 access road between Berkley Road and Liesbeek Parkway are required.

### EMME4 Modelling

The transport modelling results are summarised as follows:

- The transport modelling results have demonstrated that the present road capacity in the study area is unable to accommodate existing traffic demand. This gives rise to prolonged congestion and ever extending peak periods. Additional or upgraded road infrastructure and improved public transport services in the longer term are therefore required to support further development in the area.



- Given the positive role of public transport in the study area, it is expected that Precinct 1 of the development will have a fairly marginal impact on the surrounding road network. The full development will however benefit from the following metropolitan infrastructure improvements:
  - The extension of Berkley Road as a four-lane dual carriageway facility. The modelling results clearly illustrate a high demand for this missing link in terms of present and future traffic predictions;
  - The dualling of Liesbeek Parkway up to the proposed River Club access;
  - The implementation of a high-quality road-based public transport feeder system between Observatory, Salt River and Koeberg Stations, which could serve the development proposal more directly.

As shown in the modelling scenarios, these infrastructure improvements will primarily serve existing metropolitan traffic and should not therefore be to the full account of the River Club development.

#### Traffic Analyses: Partial Completion of Road Network

- The analysis of the partial extension of Berkley Road shows that:
  - The link road through the development draws a significant volume of traffic
  - Precinct 1 and 2 traffic can be accommodated with certain infrastructure upgrading
  - The M5 / Berkley Road interchange will have to be upgraded to a single point interchange
  - Several intersections should be upgraded to achieve acceptable LOS
- Certain road links experience capacity without the development of Precinct 1 or 2.

#### Traffic Analyses: Full completion of Road Network

- The analysis of the full extension of Berkley Road shows that:
  - Berkley Road draws a significant volume of traffic with a reduction of traffic through the development link road
  - The Berkley road extension will have to be a 4-lane road if implemented
  - Precinct 1 and 2 traffic can be accommodated without further infrastructure upgrading
  - The Malta / Berkley / Liesbeek intersection should preferably be positioned on the western side of the old Liesbeek River.
  - A traffic circle for the Malta / Berkley / Liesbeek intersection does not function at acceptable LOS even with slip lanes whereas a signalised intersection functions well.
  - The M5 / Berkley Road interchange will have to be upgraded to a single point interchange
  - Several intersections should be upgraded to achieve acceptable LOS
- Certain road links experience capacity without the development of Precinct 1 or 2.

#### Proposed Upgrades: Precinct 1

- The upgrades required for Precinct 1 includes:
  - Upgrading of Station Road / Liesbeek Parkway intersection
  - Upgrading of the Link Road / Liesbeek Parkway intersection at the new access
  - Provision of access on Berkley road extension
  - Upgrade of the M5 Berkley Road interchange to a single point interchange
  - Extension on lane of the future dual carriageway of Berkley Road from the M5 to the development access
  - Provision of a 2-lane link Road through the development linking Berkley Road partial extension with Liesbeek Parkway

- Internal intersections and turning lanes

#### Proposed Upgrades: Precinct 2

- The construction of the two Left-In Left-Out intersections on Berkley Road West Bound Carriageway
- The extension of Berkley Road from the Main Access to the Western Left-In Left-Out intersection.

#### Proposed Upgrades: other developments

- The required upgrades by others for improving LOS on road infrastructure include:
  - Upgrading of N2 / Liesbeek Parkway intersection
  - Construction of a new intersection for Malta / Berkley/ Liesbeek roads
  - Upgrade of the main access to the development to a signalised intersection with roadworks only on Berkley Road dualling
  - Dualling of Liesbeek Parkway between the N2 and Station Road
  - Dualling of Liesbeek Parkway between Link Road and Malta Road
  - Dualling of Berkley Road between the M5 and Malta Road

#### Construction Phasing & Traffic

- Construction of Precinct 1 will require appropriate accommodation of traffic measures at the M5 / Berkley and Link Road / Liesbeek Parkway intersections
- Materials for Precinct 1 will initially be transported on Liesbeek Parkway and the impact could be reduced if contractor is restricted to haul outside peak hours
- No significant impact is expected for Precinct 2 implementation.

#### Public Transport

- Public transport services exist within the surrounding area (external) of the proposed development in the form of GABS, minibus-taxis and Metrorail services;
- It is expected that up to 39% of trips will be on public transport in the early stages, with an ever-increasing use into the future;
- Potential public transport routes and stops serving Precinct 1 and also for the full development are proposed and recommended to enhance and extend the reach of public transport services or/and the provision of other services;
- Provision is made for internal public transport infrastructure facilities and various servicing modes;
- TDM measures are proposed to encourage and promote public transport use.

#### Non-motorised Transport

- Existing NMT infrastructure exists along Liesbeek Parkway, Station Road and Observatory Road including crossing facilities at the signalised intersections along Liesbeek Parkway;
- New NMT facilities and infrastructure will be required and is recommended as a result of the increased number of pedestrians (walking and public transport) and cyclists that are expected at the development to promote these modes and ensure continuous NMT links;
- NMT facilities within the development for walking and cycling is recommended and should also be accommodated for along the street network. Bicycle facilities such as cycle routes and locking facilities are

important to encourage and to make commuting more attractive and to establish a cycling culture. Wayfinding signs are recommended internally and externally at strategic locations for guidance.

### Parking

- The minimum off-street parking required for Precinct 1 of the development is 3221 parking bays;
- The minimum off-street parking required for Precinct 2 of the development is 2628 bays;
- It is concluded that this development is proposing reduced parking bay ratios and numbers ( 1048 bays less than standard) and is providing less than the minimum parking requirements to be in line with the TRUP initiatives;
- Various measures and initiatives are proposed that will contribute to the reduction in off-street parking needs i.e. enhancement of public transport and other modes of transport, shared parking areas and the future conversion of parking areas to other uses.

## **13.2 Recommendations**

Both Precincts will have an effect on the immediate road network within the vicinity of the site, however both Precincts could be accommodated with the implementation or provision of the recommended infrastructure as proposed. It is therefore recommended that Precinct 1 and Precinct 2 is approved from a transport/traffic perspective.

It is also recommended that other outstanding infrastructure as listed (dualling of Liesbeek and Berkley) be implemented progressively as other developments within the TRUP influence area are initiated.



A

Modelling Study Report



# Appendix A

## Modelling Study Report



**B**

Other Reference Reports

# Appendix B

## Other Reference Reports

Item	Report Title	Date of Report	Firm / Author
1	TRUP Final Engineering Services Model Report-April 2017	April 2017	Royal HaskoningDHV and NM & Associates Planners and Designers
2	River Club TIA Report - August 2015 Rev0	August 2015	Kantey & Templer
3	Traffic Model Analysis Report	October 2017	W Crous

These reports are available on request as a separate volume.



C

Traffic Data



# Appendix C

## Traffic Data

A large green polygon with a diagonal line running from the bottom-left to the top-right. A yellow triangle is located at the bottom-left corner. The letter 'D' is positioned in the upper-left area of the green polygon.

D

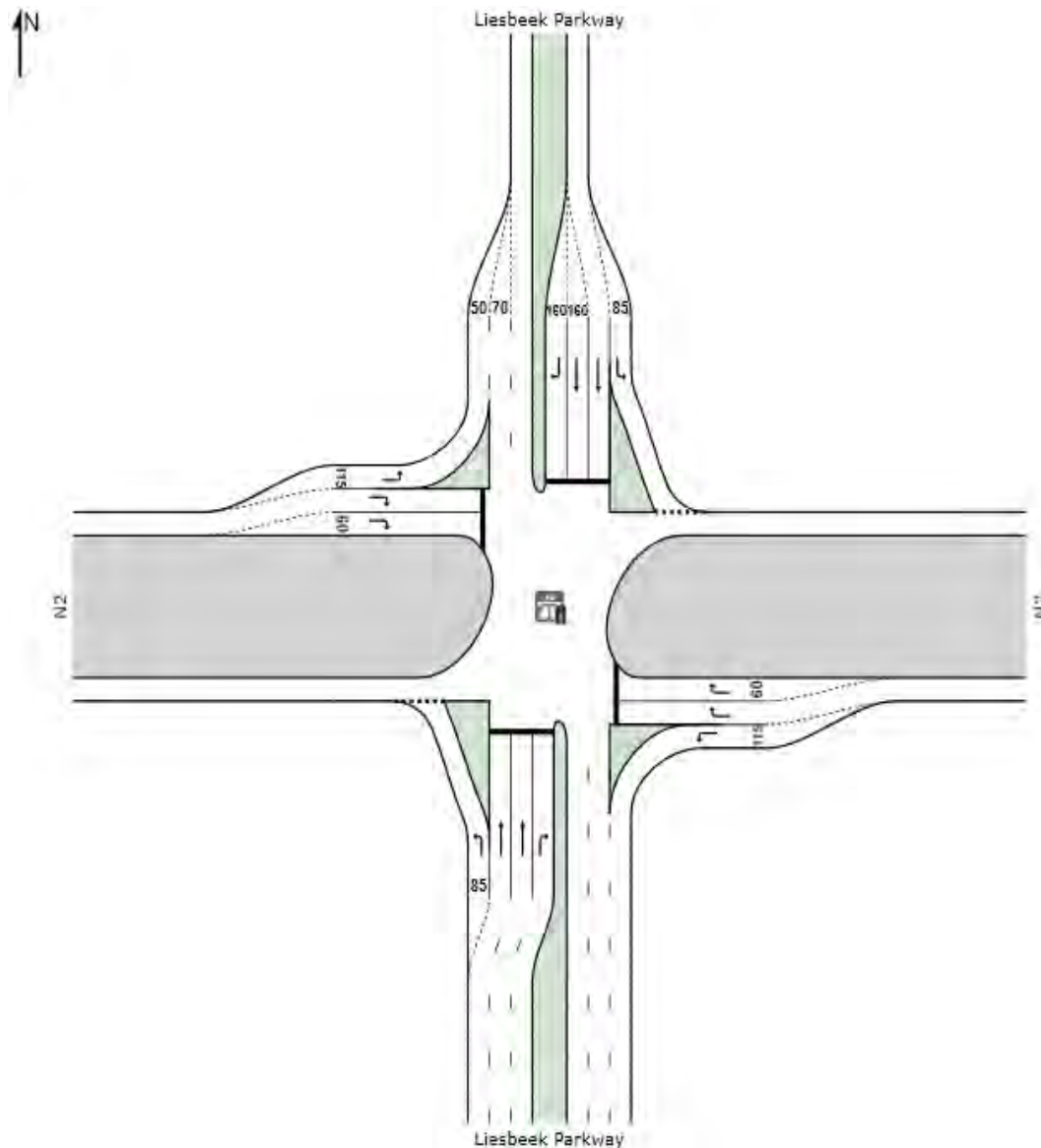
Existing Intersection Layouts

# Appendix D

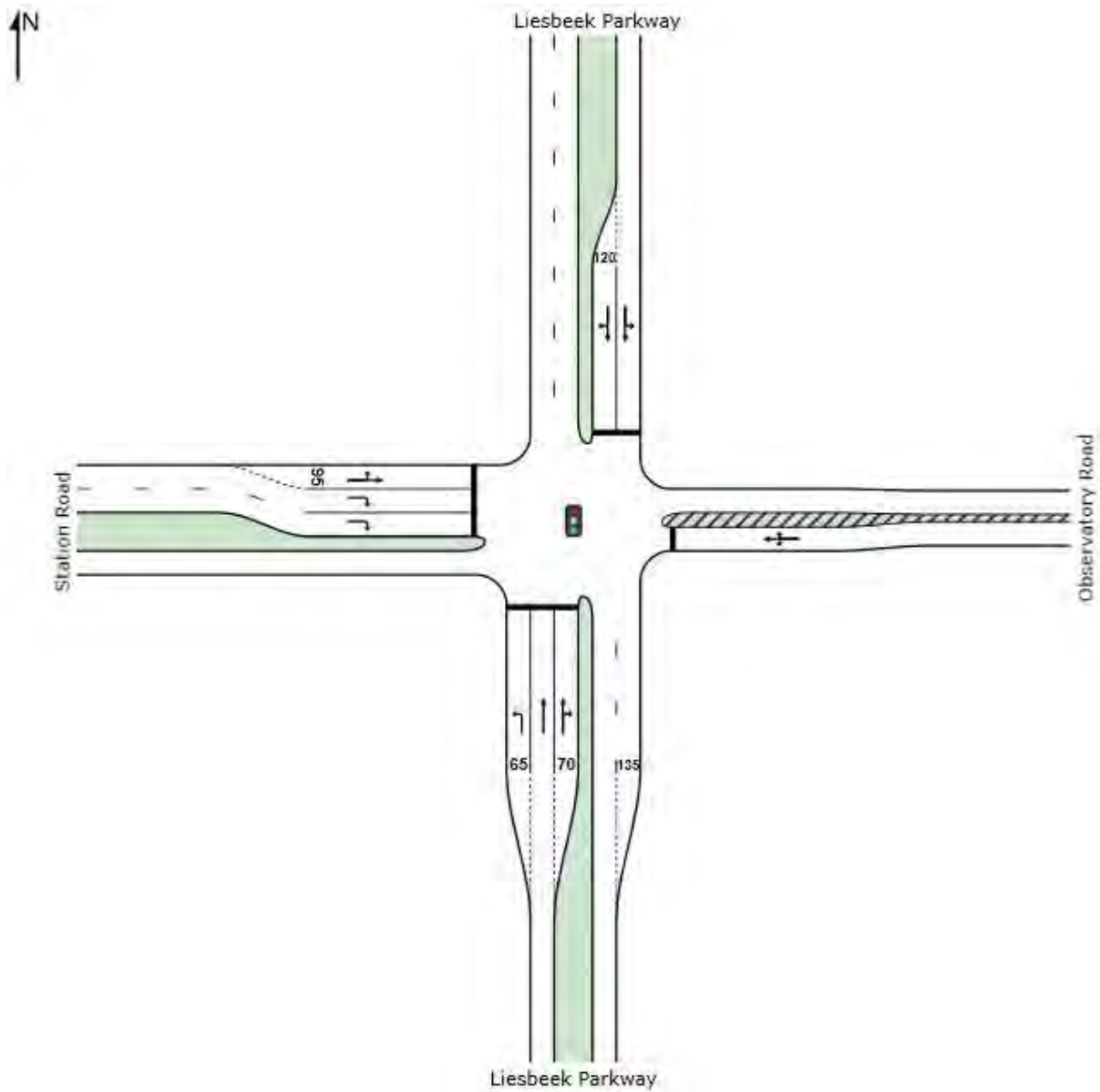
## Existing Intersection Layouts

The following existing intersection layouts are presented below:

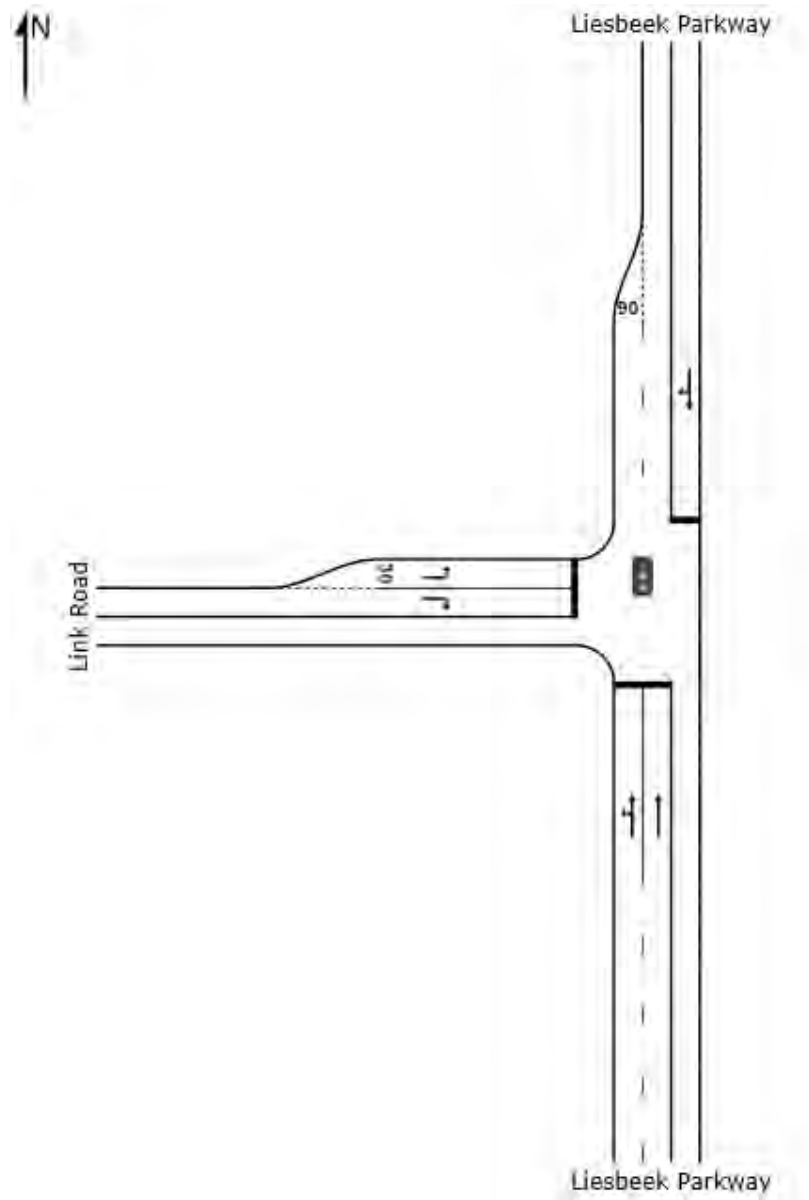
No	Description	Control
1	Liesbeek Parkway / Settlers Way on-and-off ramps	Signalised
2	Liesbeek Parkway / Observatory Road / Station Road	Signalised
3	Observatory / Existing access to the River Club	Un-signalised
4	Liesbeek Parkway / Link Road / New access	Signalised
5	Liesbeek / Malta / Berkley	Un-signalised Access to PRASA
7	M5 North / Berkley Road Ramp Terminal	Un-signalised but future signalised
8	M5 South / Berkley Road Ramp Terminal	Un-signalised but future signalised



Geometric Layout of intersection 1 – N2 and Liesbeek Parkway

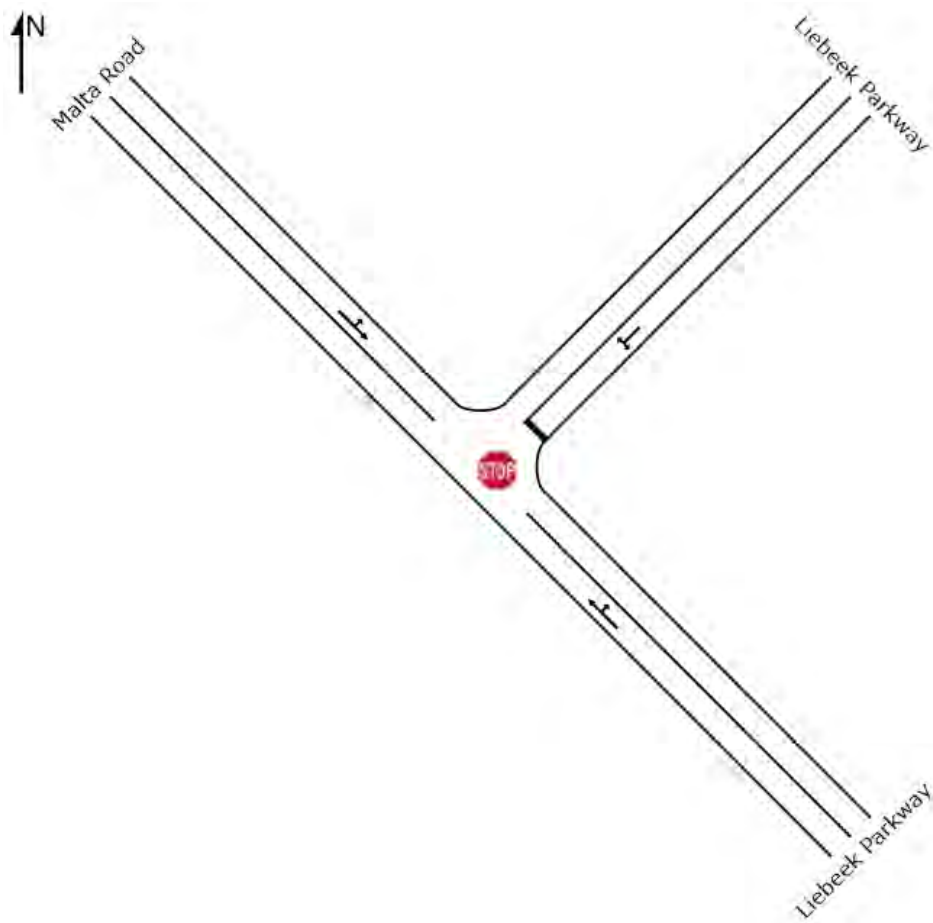


Geometric Layout of intersection 2 – Liesbeek Parkway and Observatory Road

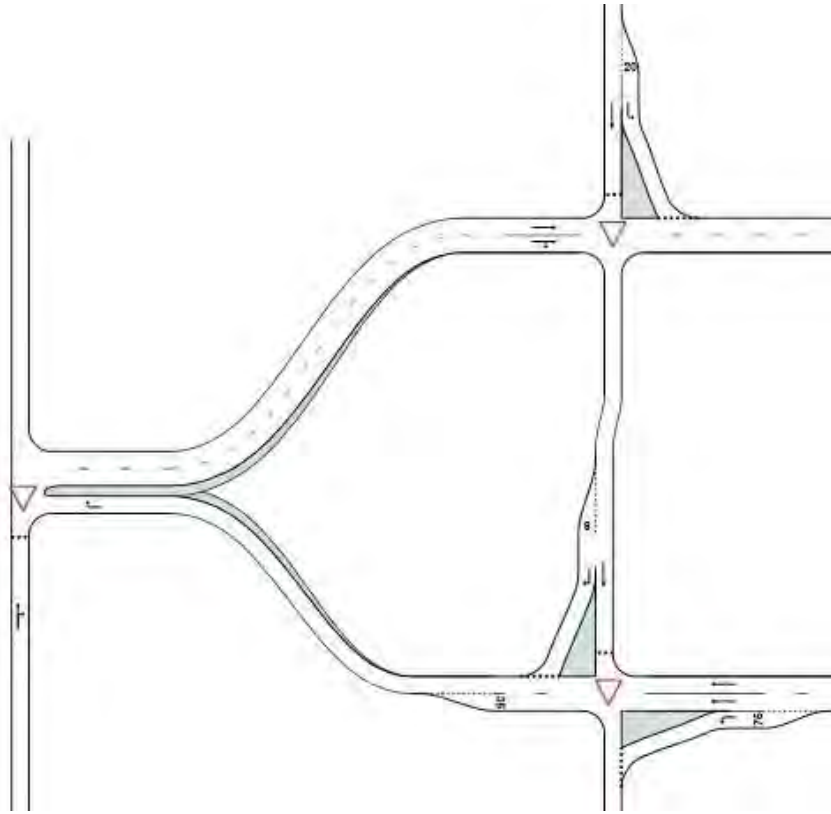


Geometric Layout of intersection 4 - Liesbeek Parkway and Link Road





Geometric Layout of intersection 5 - Liesbeek Parkway and Malta Road



Geometric Layout of intersection 7 and 8 – M5 ramp terminals and Berkley Road



E

Sidra Output Results

# Appendix E

## Sidra Output Results

The following Sidra Output information for the various intersections are presented:

Item	Description
A1	2017 Traffic (from counts) on Existing Geometry
A2	2017 traffic (from Model) on Existing Geometry
B1	Scenario EX1: Development Precinct 1 on Partially Extended Network
B2	Scenario EX2: Development Precinct 1 and 2 on Partially Extended Network
C2	Scenario FU2: Development Precinct 1 and 2 on Future Network
C3	Scenario FU3: Development Precinct 1 and 2 and Pragmatic Densification on Future Network

These results are available on request as a separate volume.

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